February 19, 2020

The Honorable Anne R. Kaiser, Chair
House Ways and Means Committee
131 House Office Bldg.
Annapolis, MD 21401-1991

**Re: HB 516 – Public School Students - Daily Physical Activity (Student Health and
        Fitness Act) – Letter of Information**

Dear Chair Kaiser and Committee Members:

The Maryland Department of Health (Department) respectfully submits this letter of information
for HB 516 – Public School Students - Daily Physical Activity (Student Health and Fitness Act)
for the consideration of the committee.

Diabetes is the sixth leading cause of death in Maryland and a major risk factor for
cardiovascular disease, the number one cause of death for Marylanders. Diabetes prevention has
been identified as one of Maryland's population health goals related to the Total Cost of Care
Model.

The Department released its Diabetes Action Plan (enclosed) in November 2019 to reduce the
burden of diabetes in Maryland. The plan is a collaborative effort between health care partners
and community-based organizations to align efforts, resources and funding. The plan
recommends a multi-faceted strategy, including:

- Expanding nutrition and obesity prevention programs in every community;
- Sharing data among health care providers, program providers and state agencies;
- Supporting healthy eating at worksites, health systems and school cafeterias;
- Assessing the food supply chain to address food pricing and access to healthy foods;
- Increasing opportunities for students to have physical activity during and after the school
  day;
- Referring overweight children and adults to evidence-based weight and lifestyle
  counseling; and
- Engaging partners to support state-of-the-art diabetes care including the use of
  telemedicine, case managers and community workers.

If you have additional questions, please contact Director of Governmental Affairs, Webster Ye, at (410) 260-3190 or webster.ye@maryland.gov.

Sincerely,

Robert R. Neall
Secretary

EXECUTIVE SUMMARY

In Maryland, over 10 percent of the adult population has diabetes. An additional 34 percent of adults are estimated to have prediabetes, a condition of high blood sugar not quite high enough to be diabetes. Diabetes is the sixth leading cause of mortality in Maryland, and the fifth leading cause of death for Black Marylanders in 2017. Diabetes is also a major risk factor for developing cardiovascular disease, the number one cause of death for Marylanders. It is imperative to launch a coordinated and meaningful initiative to address the prevention and management of diabetes in Maryland. The leading cause of diabetes is overweight and obesity, the rate of which has steadily increased to over 64 percent of Maryland adults. Sedentary lifestyle is also a risk; only 50 percent of Marylanders said they participated in 150 minutes or more of physical activity per week in 2017. Additionally, there are disparities in how diabetes and its risk factors affect Marylanders with racial/ethnic minorities, those with less education, lower income, and various disabilities disproportionately affected. Diabetes and its complications cost the State over $4.92 billion per year, and an additional $2 billion in lost productivity.

The Maryland Diabetes Action Plan (the Plan) includes details on the current burden of diabetes and the factors impacting diabetes risk. The Plan presents action steps that organizations and partners can implement to prevent and manage diabetes in Maryland. These actions steps are categorized using a systems change model approach, working upstream to people at a healthy weight, then progressing as the risk increases with people who are overweight and obese, followed by those with prediabetes or history of gestational diabetes, and finally includes steps to improve outcomes in those identified with diabetes and diabetes complications.

Our vision is that an array of all Maryland partners, across multiple sectors, will identify opportunities, act in their areas of influence in ways that align efforts, resources, and funds to reduce the burden of diabetes. The Plan includes action tables that contain strategies and actions steps targeted to support people across the continuum of diabetes:

1. Keeping people at a healthy weight Goal: By 2024, 32 percent of Maryland adults will be of healthy weight. The two objectives are to increase access to healthy nutrition and achieve and maintain recommended physical activity levels for all Marylanders.

2. People who are overweight and obese Goal: By 2024, maintain the percentage of adults with a BMI >25 at 66.5%; and reduce by 10% the BMI >85th percentile in high school students. The two objectives are to improve clinical care services for overweight and obese children and adults and improve the availability of health lifestyle options for overweight and obese children and adults.

3. People with prediabetes and gestational diabetes Goal: By 2024, increase the prevalence of Maryland adults who know their prediabetes status by 30%. The two objectives are to

improve prediabetes outcomes and reduce risk of diabetes in women with a history of gestational diabetes.

4. People with diabetes Goal: By 2024, reduce the age-adjusted diabetes mortality by 5%. The first objective is to improve the use of standardized quality of care for people with diabetes at all levels of the health care system by increasing the number of health systems statewide that utilize the chronic care model (CCM) framework, as recommended by the American Diabetes Association's 2019 Standards of Medical Care in Diabetes. The second objective is to reduce the number of hospitalizations and emergency department visits each by 5% for people with diabetes in the state of Maryland.

In preparation of this Diabetes Action Plan, a process was completed to inventory obesity, prediabetes, and diabetes programs in Maryland. The aim of the inventory is to assess the availability of programs across Maryland that address diabetes prevention, care, and management. While the required level of service provision across the state cannot be determined through the inventory alone, the Maryland Department of Health aims to use this process to begin to identify resource gaps and opportunities to expand efforts to address diabetes moving forward. The scope of the inventory is all programs serving Marylanders, including those that serve Medicaid enrollees, Medicare enrollees, commercial and small business health insurance enrollees, and the uninsured population.

MDH published an online draft of the plan and encouraged the public and partners to provide feedback. Over 30 responses were submitted by institutions and individuals. MDH worked to integrate the feedback into this final version.

As Maryland seeks to prevent and better manage diabetes, all partners are encouraged to implement action steps, while also sharing innovative and best practices for expansion across the state that aligns with the Diabetes Action Plan and improves the health of all Marylanders.

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I.   The Burden and Consequences of Diabetes in Maryland

What is Diabetes?

Diabetes is a chronic disease that affects the way the body handles glucose, which is the sugar in the blood used by the body for energy. An inability of cells to properly absorb glucose, due to inadequate insulin production or a resistance of cells to the action of insulin, or both, results in high blood glucose levels, which is called diabetes. There are several types of diabetes, the most common of which is type 2 diabetes. The other major types are type 1 diabetes, which usually has onset during childhood and adolescence, and gestational diabetes, which occurs during pregnancy.[1]

Type 1 diabetes results from an autoimmune attack against the cells in the pancreas that produce insulin. This leads to an almost complete lack of insulin, early severe symptoms, and a dependence on insulin treatment to sustain life. About 4% of diabetes in the United States is Type 1 diabetes.[2] The risk factors and interventions discussed in this plan may not all apply to Type 1 diabetes.

Type 2 diabetes results in most cases from a resistance to the action of insulin on cells. This insulin resistance is related to overweight and obesity, particularly fat located in the abdomen. The degree to which the insulin resistance manifests as high blood sugar depends on how well, and for how long, the pancreas can overproduce insulin to compensate for the insulin resistance in the cells. A decline in the insulin production capacity with older age is one reason that type 2 diabetes often emerges at older ages. Type 2 diabetes can exist without symptoms for years, which is why approximately 24% of persons with diabetes don't know that they have it.[3] About 95% of diabetes in the United States is type 2 diabetes. The risk factors and most interventions discussed in this plan are designed for type 2 diabetes.

Most public health surveillance data do not distinguish between type 1 and type 2 diabetes but refer to the two combined. However, since type 2 diabetes is 95% of the total, patterns seen in the surveillance data are the patterns of type 2 diabetes. [4] Public health data also often only measure persons who know that they have diabetes, which means that true diabetes prevalence may be approximately one quarter higher than the estimates of diagnosed diabetes prevalence.

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[1] Diabetes Care. January 01 2019; volume 42 issue Supplement 1.
[2] ADA website https://www.diabetes.org/resources/statistics/statistics-about-diabetes
[3] Id
[4] Id

Prediabetes is a condition where blood sugar levels are higher than normal, but not high enough to be considered diabetes.[1] Prediabetes is a precursor condition on the pathway from normal glucose levels to type 2 diabetes; the development of type 1 diabetes is usually so rapid that there is no "prediabetes" state that precedes type 1 diabetes. A fasting glucose level of 100 to 125 mg/dL, a hemoglobin A1C level of 5.7% to 6.4%, or a two-hour glucose level in an oral glucose tolerance test of 140 to 199 mg/dL defines prediabetes.[5]

Prediabetes often goes unrecognized by both individuals and their health care providers; nine of 10 adults who have prediabetes do not know they have it.[6] CDC estimates that 34 percent of U.S. adults have prediabetes.[7] Diabetes and prediabetes are serious conditions that can lead to complications including heart disease and stroke, blindness, amputations, nerve damage, and kidney disease.[1]

A disease is important to public health if it is both common and has serious consequences. Diabetes is both common and serious in Maryland.

How Common is Diabetes in Maryland?

Adults with Diagnosed Diabetes and Its Precursor Conditions in Maryland

An estimated 10.5% of the adult population in Maryland, or 488,942 adults, have diabetes.[8,9] In Maryland an estimated 1.6 million adults or 34 percent of the adult population have prediabetes (see Figure 1 below).[10,11]

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[5] https://www.cdc.gov/diabetes/basics/getting-tested.html
[6] https://www.cdc.gov/diabetes/basics/prediabetes.html
[7] Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2017.
[8] Maryland Behavioral Risk Factor Surveillance System (BRFSS), 2017.
[9] United States Census, 2017.
[10] Diabetes Care. January 01 2019; volume 42 issue Supplement 1.
[11] Based on Maryland Adult Population, sources: US 2017 Census; 2017 Maryland BRFSS; and Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2017.

Figure 1: Diabetes Risk Continuum[12]

Diabetes Risk Continuum

Healthy Population	Overweight and Obese	Prediabetes	Diagnosed Diabetes and Diabetes with Complications
1,351,479 (32%)	2,799,259 (66.2%)	1,575,829 (33.9%)	488,942 (10.5%)
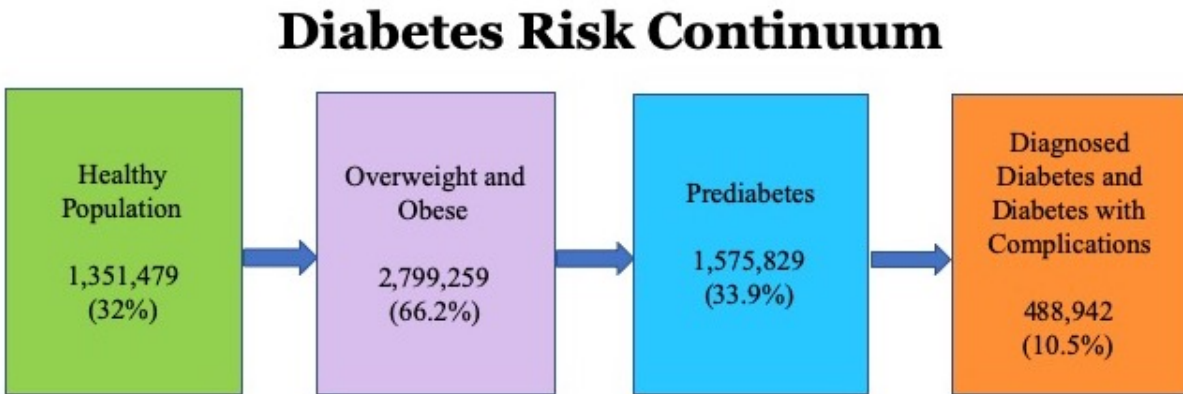
The adult prevalence of diagnosed diabetes is highest in Non-Hispanic (NH) Blacks, followed by Non-Hispanic Asians and Hispanics, and lowest in Non-Hispanic Whites, as shown in Figure 2 below.

Figure 2: Age-adjusted Adult Prevalence of Diagnosed Diabetes by Race/Ethnicity (R/E), Maryland 2015-17 (BRFSS)

Age-adjusted Prevalence of Diagnosed Diabetes, Maryland 2015-17 (BRFSS data)

Race/Ethnicity	Prevalence
NH White	8.0%
NH Black	13.3%
NH Asian	9.7%
Hispanic	9.4%
All R/E	9.7%

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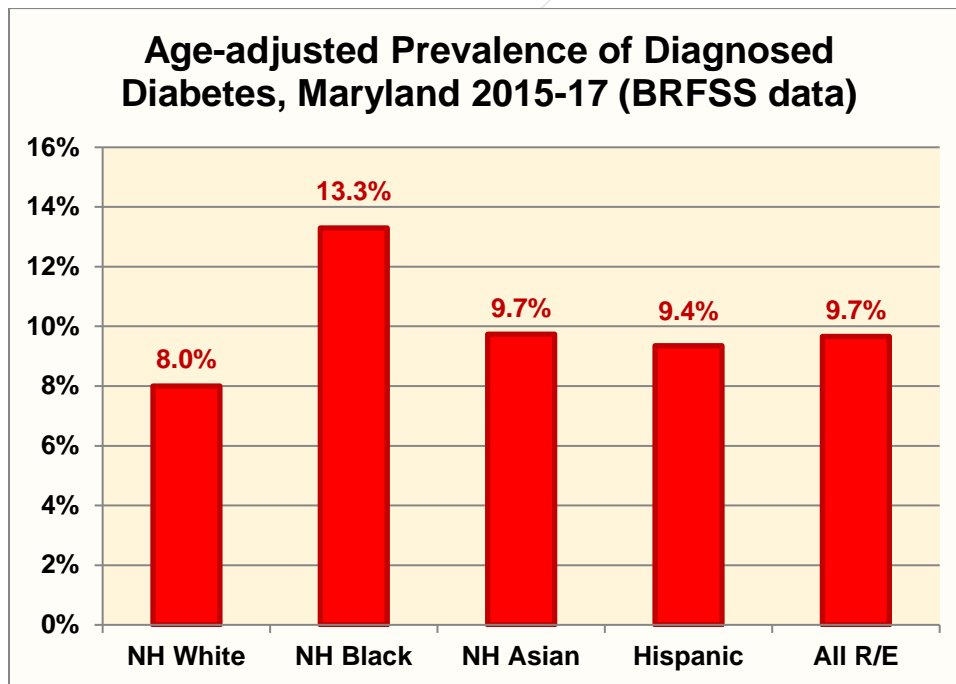
[12] Based on Maryland Adult Population, sources: US 2017 Census; 2017 Maryland BRFSS; and Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2017. Categories are not equal, percentages in this figure do not equal 100.

Geographic Distribution of Diabetes in Maryland

Adult prevalence of diagnosed diabetes is mapped in Figure 3 below. As shown in Figure 4 on the next page, the jurisdictions with prevalence rates of adults with diagnosed diabetes that exceed the Maryland Statewide rate are Dorchester, Allegany, Prince George's, Garrett, Washington, Somerset, and Caroline Counties and Baltimore City.[13] These high rates of diabetes are seen in jurisdictions with high minority populations (Baltimore City, Prince George's County) and in certain rural jurisdictions in Western and Southern Maryland and on the Eastern Shore. Notably, all three jurisdictions in Western Maryland are among the six highest prevalence rates.

Figure 3: Map of Age-Adjusted Adult Prevalence of Diagnosed Diabetes by Jurisdictions, Maryland, 2015-2017
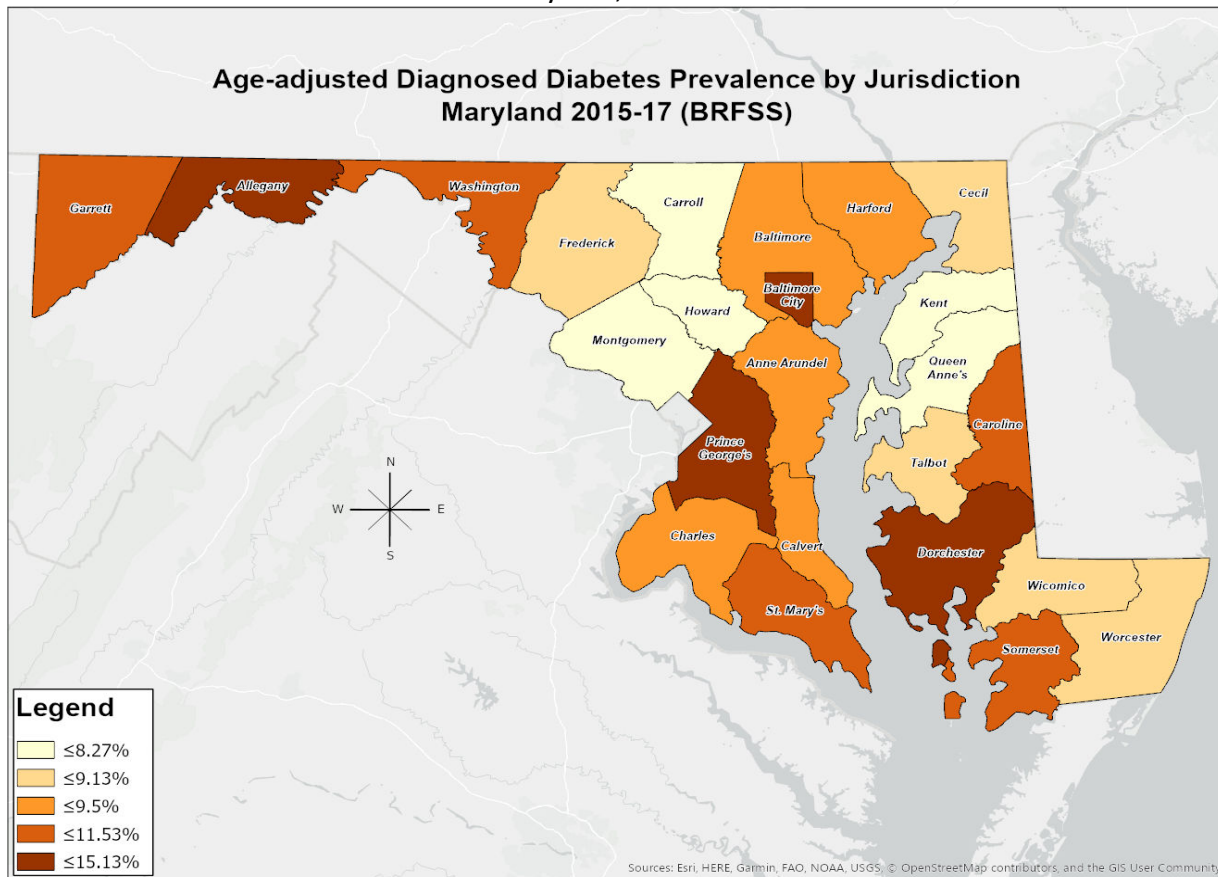
There are several reasons for the high diabetes prevalence rates in rural jurisdictions. Many rural residents experience risk factors for diabetes and may lack access to services to prevent diabetes or manage their diabetes. Rural residents, as well as the urban poor, experience

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[13] Maryland BRFSS, 2015-2017.

barriers to adequate physical activity and healthy eating.[14] Additional challenges revolve around access to health care, including resource shortages of physicians and providers located in rural areas. Workforce shortages in rural areas may decrease provider referral to National DPP, Diabetes Self-Management Education and Support (DSMES) programs, Chronic Disease Self-Management programs and nutrition programs, as well as the availability of these programs. Other challenges include limited access to transportation to travel to appointments with primary care or specialty care providers.

Figure 4: Age-adjusted Adult Prevalence of Diagnosed Diabetes by Jurisdiction, Maryland 2015-17 (BRFSS)

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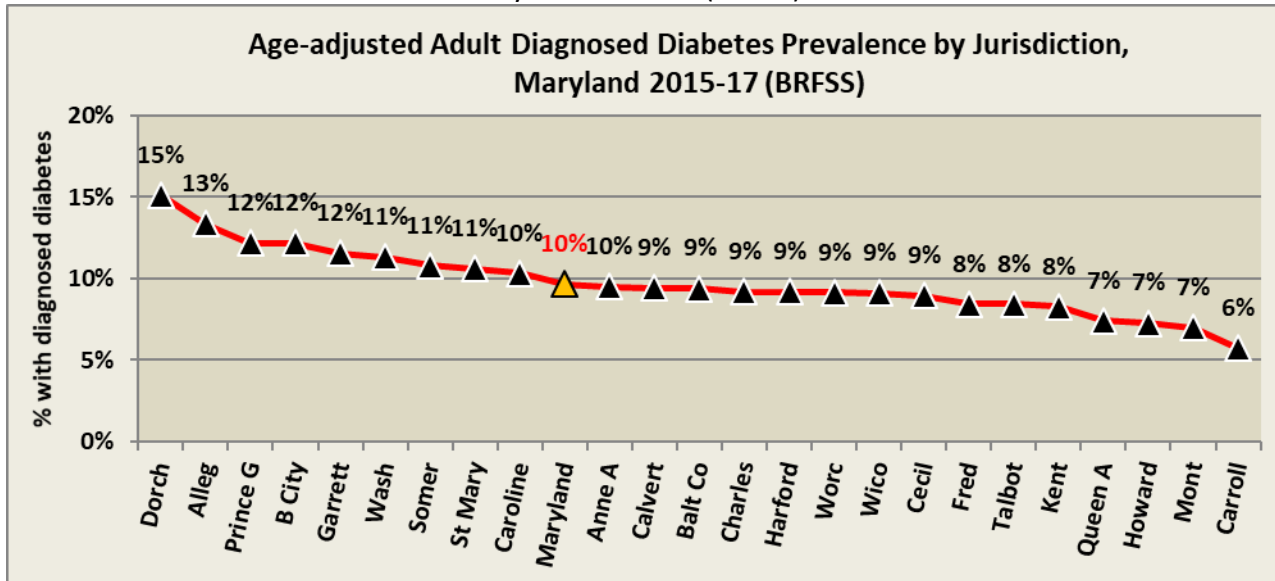
[14] O'Connor A and Wellinius G. Rural-urban disparities in the prevalence of diabetes and coronary heart disease. Public Health. October 2015, vol. 126: 813-820

Figure 5: Age-adjusted Adult Prevalence of Diagnosed Diabetes by Race and Jurisdiction, Maryland 2015-17 (BRFSS)
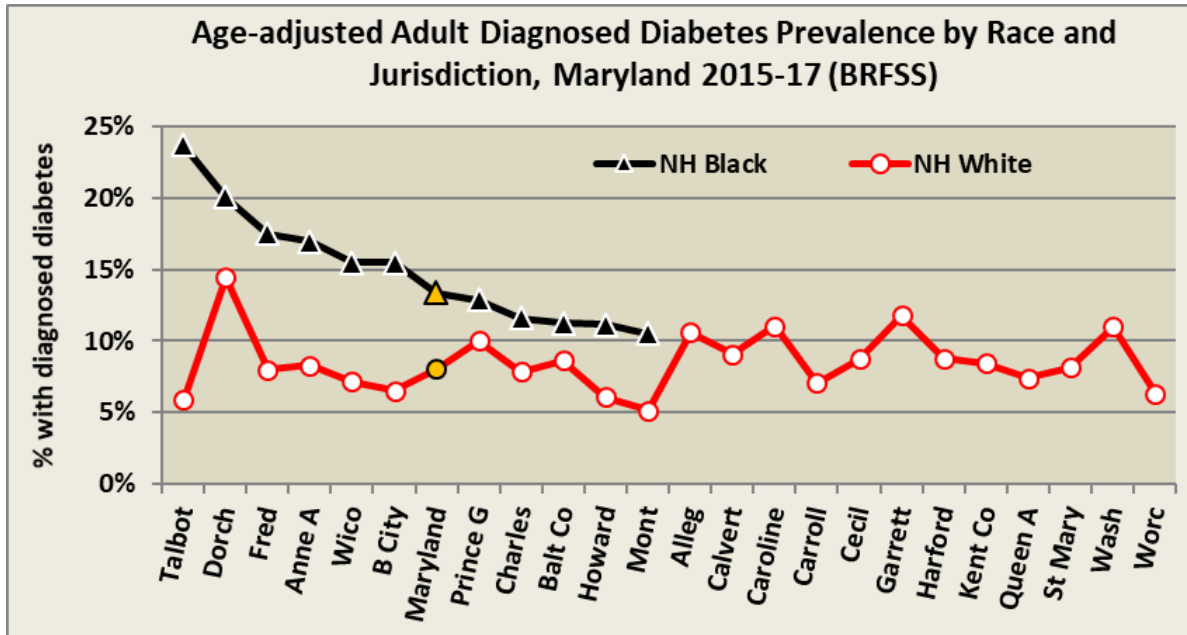
The range of adult diabetes prevalence rates becomes even greater when rates by race and jurisdiction are examined, as shown in Figure 5. The Non-Hispanic White rate in Dorchester County is particularly high at 14%, with other Non-Hispanic White rates ranging from 5% to 12%. The Black rates start at a low of about 11% in Howard and Montgomery counties and rise to a high of 20% and 24% in Dorchester and Talbot counties respectively (among the jurisdicitons where the Non-Hispanic Black rate is reportable). Of note, Dorchester County has the highest Non-Hispanic White rate, and the second highest Non-Hispanic Black rate.

These data indicate that diagnosed diabetes is common in Maryland, and that the burden of diabetes prevalence varies by race and place. The consequences of diabetes for Maryland are presented below.

How Serious are the Consequences of Diabetes for Maryland?

Diabetes as a Cause of Death

Diabetes is the sixth leading cause of death in Maryland; in 2017, 2.9 percent of all deaths in the State were due to diabetes.[15] Diabetes is also a risk factor for heart disease (leading cause of death in Maryland) and stroke (third leading cause of death in Maryland), and so contributes to even more deaths in Maryland than those specifically attributed to diabetes on death

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[15] Maryland Vital Statistics Annual report (2017): https://health.maryland.gov/vsa/Documents/Reports%20and%20Data/Annual%20Reports/2017annual_revised.pdf

certificates.[16]

Figure 6 below shows that the age-adjusted diabetes mortality rate in Maryland declined from 21.7 in 2008 to a recent low of 18.3 in 2015, but then rose to 20.3 per 100,000 people in 2017. This increase from 2015 to 2017 occurred in the Black population but not in the White population. Consistent with the greater burden of diabetes prevalence in the Black community, the diabetes mortality rate for Blacks is about twice as high as the mortality rate for Whites.[17]

Comparing Maryland to the United States (Figure 7), death rates were essentially identical in 2008. From 2008 to 2015, Maryland improved more rapidly than the US. However, after 2015, the rising Black diabetes death rate in Maryland has resulted in the overall Maryland rate converging toward the national rate.[18,19]

Figure 6: Age-Adjusted Death Rate for Diabetes, by Race, Maryland 2008-2017

Age-adjusted Death Rate* for Diabetes by Race, Maryland, 2008-2017.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
All Races	21.7	20.7	19.8	20.8	19.1	19.0	19.6	18.3	19.6	20.3
White	17.6	17.1	15.3	17.0	15.9	15.2	16.0	15.7	15.8	15.9
Black	37.2	34.4	35.4	33.8	31.3	31.8	33.4	27.9	31.3	33.2

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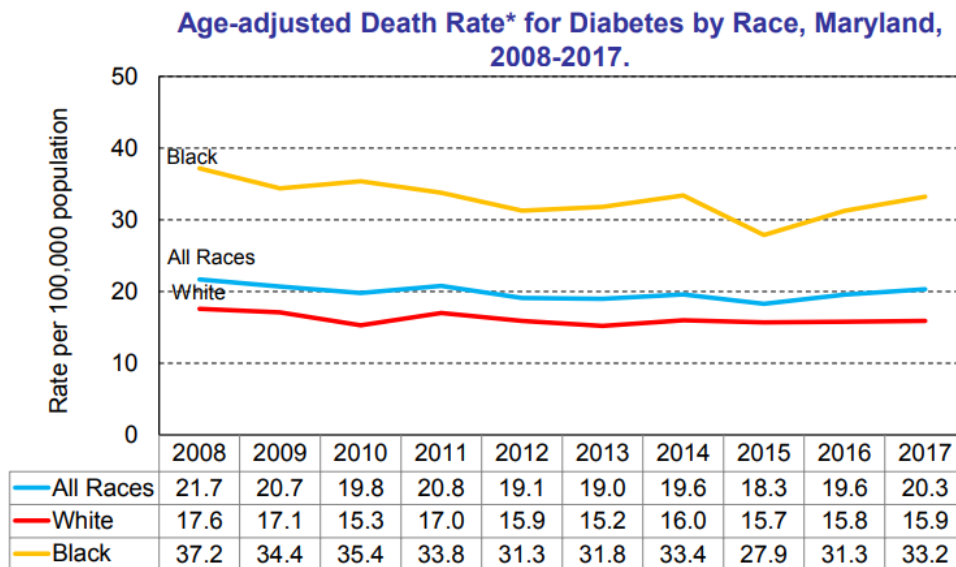
[16] https://www.cdc.gov/diabetes/diabetesatwork/pdfs/DiabetesWhatIsIt.pdf
[17] Id fn 11
[18] Id fn 11
[19] Id fn 11

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Figure 7: Age-adjusted Death Rate for Diabetes, Maryland and the United States, 2008-2017

Age-Adjusted Death Rate* for Diabetes, Maryland and the United States, 2008-2017.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
MD	21.7	20.7	19.8	20.8	19.1	19.0	19.6	18.3	19.6	20.3
US	21.8	21.0	20.8	21.6	21.2	21.2	20.9	21.3	21.0	**
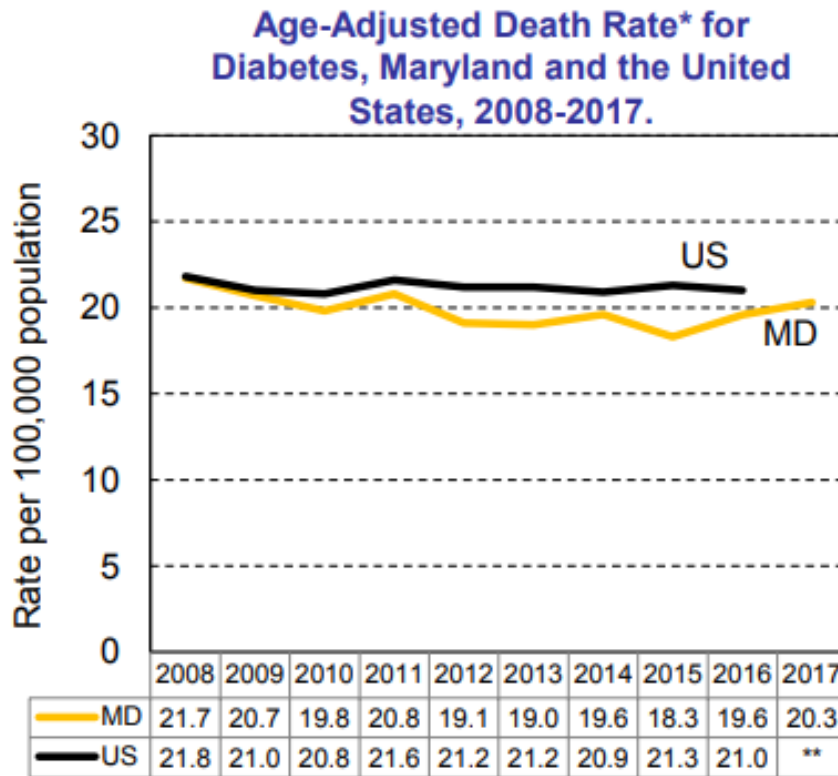
*Death rates are age-adjusted to the 2000 U.S. standard population.

Source: Maryland Vital Statistics Annual report (2017)

Complications of Diabetes

Diabetes causes a variety of serious complications related to its effects on large and small blood vessels. Diabetes promotes atherosclerosis, the process where cholesterol builds up in the larger blood vessels. This increases the risk of heart disease, heart attacks, strokes, and peripheral vascular disease (blocked arteries in the arms and legs). The effects of diabetes on small blood vessels leads to eye disease, blindness, kidney disease, end-stage kidney failure that requires transplant or dialysis, and nerve disease. The combination of nerve disease and vascular disease in the legs results in amputations caused by diabetes.[20]

Utilization Rates and Costs for Diabetes

Diabetes-related hospital discharges in Maryland

In 2018, a total of 11,735 hospital discharges (inpatient and observation stays greater than or equal to 24 hours) were reported with diabetes as the primary diagnosis among Maryland

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[20] https://www.cdc.gov/diabetes/diabetesatwork/pdfs/DiabetesWhatIsIt.pdf

adults aged 18 years or older. This is equivalent to 2.5 hospital discharges per 1000 Maryland adults. [21] [22]

Table 1: Diabetes-related Hospital Discharge Count and Rate per 1000 Adult Marylanders

	2013	2014	2015	2016	2017	2018
Discharges	10,676	10,689	10,357	10,823	11,735	11,738
Discharges per 1000 adults	2.38	2.35	2.26	2.35	2.52	2.53

The numerator is discharges with diabetes-related primary diagnosis code at Maryland hospitals among adults with valid Maryland zip codes, denominator is adult Maryland population based on 5-year American Community Survey. 2017 denominator is used for 2018 (as 2018 data was not available at the time of this report).

Diabetes-related Prevention Quality Indicators (PQIs)

PQIs reflect admissions for ambulatory-care sensitive conditions that could have been prevented with access to high-quality outpatient care. The Agency for Healthcare Research and Quality has specified 4 individual PQIs[23,24] for diabetes and one composite:
- PQI 01 Diabetes Short-Term Complications Admission Rate (primary diagnosis code of diabetes with: ketoacidosis, hyperosmolarity, or coma)
- PQI 03 Diabetes Long-Term Complications Admission Rate (primary diagnosis code of diabetes with: renal, eye, neurological, circulatory, or complications not otherwise specified)
- PQI 14 Uncontrolled Diabetes Admission Rate (primary diagnosis code of diabetes without mention of short term or long-term complications)
- PQI 16 Lower-Extremity Amputation among Patients with Diabetes Rate (any-listed diagnosis of diabetes and any-listed procedure of lower-extremity amputation)
- PQI 93 Diabetes Composite (includes any of the four above PQIs)

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[21] Trends between the ICD9 period (2013-2015) and ICD 10 period (2016-2018) should be treated with caution due to ICD transition. For this section, diabetes refers to Type 1 and Type 2 diabetes.
[22] MATCH, Health Service Cost Review Commission (HSCRC), Maryland Hospital Discharges and Ambulatory Care Data.
[23] https://www.healthypeople.gov/2020/topics-objectives
[24] Many, but not all, discharges with a primary diagnosis of diabetes are included in the PQI counts. For example, Marylanders younger than 18 and those transferred from another institution are not included in the PQI counts

As indicated in the table below, the number of Diabetes PQIs in Maryland and the rate of Diabetes PQIs per 1000 adults have fluctuated over time but have generally increased since 2013.[25]

Table 2: PQI 93 Discharge Frequency and Rate per 1000 Adult Marylanders

	2013	2014	2015	2016	2017	2018
PQI 93 Discharges	10,494	10,511	10,045	9,539	10,484	11,571
Discharges per 1000 adults	2.34	2.34	2.24	2.13	2.34	2.58

The disease burden of diabetes also reflects a healthcare disparity by race (see Figure 8). Black Marylanders experience a higher rate of diabetes-related avoidable hospitalizations compared to white Marylanders, with 434 people having diabetes-related avoidable hospitalizations for every 100,000 Black Marylanders (or 4.34 per 1000) compared to 170 for every 100,000 White Marylanders (or 1.7 per 1000) in 2017.[26] This means that the

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[25] MATCH, Health Service Cost Review Commission (HSCRC), Maryland Hospital Discharges and Ambulatory Care Data.
[26] MATCH, Health Service Cost Review Commission (HSCRC), Maryland Hospital Discharges and Ambulatory Care Data.

black rate is 2.6 times as high as the White rate, and that 62% of Black discharges are excess (would not occur if Black rate was the same as White rate).

Figure 8: Diabetes Composite (PQI 93) per 100,000 Population Aged 18+ in Maryland
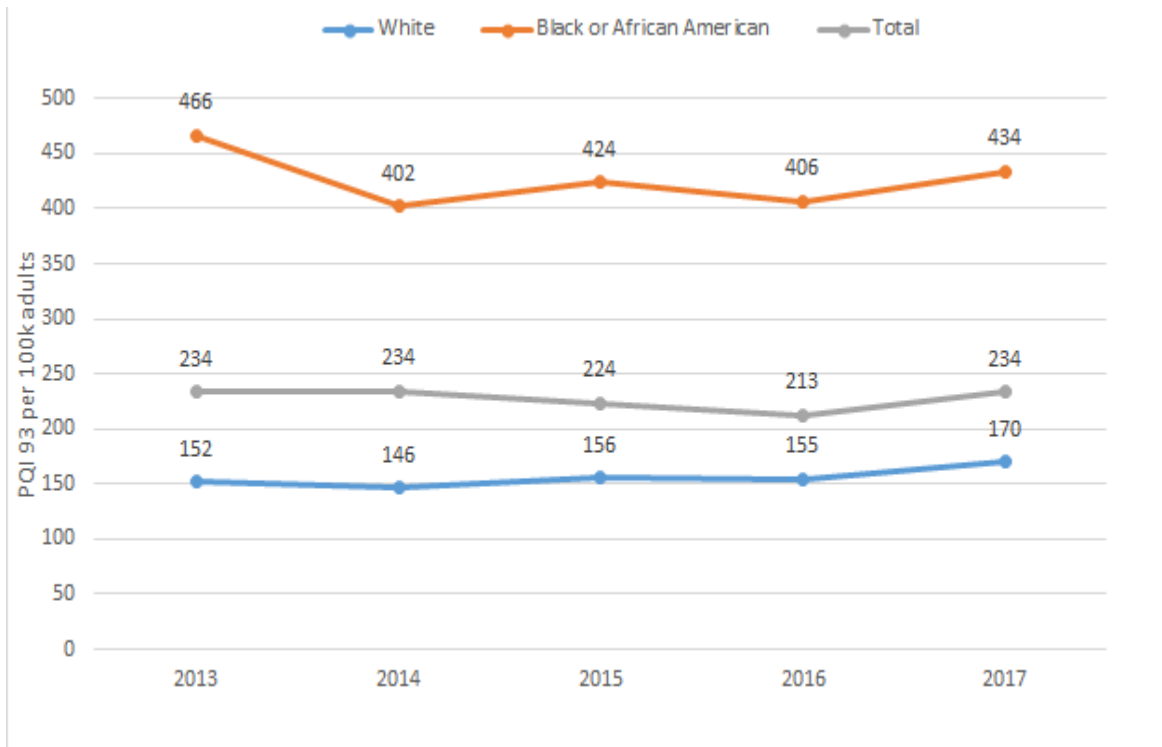
Diabetes Inpatient Hospital Charges

In 2017, Maryland hospitals charged approximately $197 million for diabetes-related hospital stays for Marylanders, compared to $150 million dollars in 2013, an increase of more than 30%. This estimate includes Maryland residents of all ages with a primary diagnosis of diabetes or a diabetes-related complication (such as lower-extremity amputation). The estimate excludes patients seen in the ED and released without an inpatient stay.

Diabetes Emergency Department Visits

In 2017, there were a total number of 121,301 ED visits related to Diabetes.[27] This indicates a rate of 20.23 visits per 1,000 Marylanders.

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[27] Defined based on CCS categories among all patients at Maryland hospitals

Table 3: Diabetes-related ED Visit Count and Rate per 1,000 Population

	2013	2014	2015	2016	2017
Number of ED visits	122,439	123,875	124,928	124,420	121,301
Population	5,834,299	5,887,776	5,930,538	5,959,902	5,996,079
Visit Rate per 1,000	20.99	21.04	21.07	20.88	20.23

Utilization Differences for Medicaid Enrollees with Diabetes vs. Without Diabetes

To further demonstrate, the individual and societal costs of diagnosis of diabetes, the data below reflects utilization differences for Medicaid enrollees with and without diabetes.

- Are 2.4 times as likely to have an inpatient admission
- Have four times as many admissions per enrollee
- Are 1.3 times as likely to have an ED visit
- Have 1.7 times as many ED visits per enrollee
- Are 1.1 times as likely to have an ambulatory visit
- Have 2.3 times as many ambulatory visits per enrollee
- Have 3.1 times the level of average fee-for-service payment, and
- Have 2.5 time the level of average MCO payment.

Table 4: Admission, ED Visit, and Ambulatory Visit Prevalence and Rates; and Average Payments Comparing Medicaid Enrollees with and without Diabetes, Maryland, 2017[28]

Calendar Year 2017	Medicaid Enrollees with Diabetes	Medicaid Enrollees without Diabetes	Ratio: Diabetes to No Diabetes
% with One or More Inpatient Admissions	**24.8%**	**10.3%**	**2.4**
Average Admissions per Enrollee	**0.4**	**0.1**	**4.0**
% with One or More ED visits	**42.7%**	**33.2%**	**1.3**
Average ED visits per Enrollee	**1.2**	**0.7**	**1.7**
% with One or More Ambulatory Visits	**93.4%**	**87.0%**	**1.1**
Average Ambulatory Visits per Enrollee	**11.8**	**5.1**	**2.3**
Average Fee-for-Service Payment	**$12,334**	**$3,961**	**3.1**
Average MCO Payment	**$9,794**	**$3,909**	**2.5**

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[28] Maryland Department of Health, Health Care Financing/Medicaid, data provided September 2019.

Cost Burden of Diabetes in Maryland

Diabetes and prediabetes cost an estimated $7.01 billion in Maryland each year.[29] Serious complications of diabetes include heart disease, stroke, amputation, end-stage kidney disease, blindness, and death.

People with diabetes have medical expenses approximately 2.3 times higher than those who do not have diabetes.[30] Total direct medical expenses for diagnosed and undiagnosed diabetes, prediabetes and gestational diabetes in Maryland was estimated at $4.92 billion in 2017.[29] In addition, another $2.09 billion was spent on indirect costs from lost productivity due to diabetes.[29]

People with diabetes cost the State's Medicaid program twice as much as those without the chronic condition, a study commissioned by MedChi, the Maryland State Medical Society has found.[31] No other insurance utilization data was available at the time of plan completion.

Medicaid Costs of Diabetes in Maryland

Diabetes has a significant financial impact on the Maryland Medicaid program. In CY 2017, total expenditures for Medicaid participants with diabetes amounted to nearly $1.9 billion dollars. Between CY 2013 and CY 2017, total Medicaid per-member-per-month (PMPM) expenditures for individuals with diabetes was two to three times higher than users without diabetes ($1,652 vs. $688 in CY 2017). Similar to the PMPM expenditures, average Medicaid expenditures among eligible individuals with diabetes was two to three times higher than for individuals without diabetes ($18,202 vs. $7,516 in CY 2017).[32] For individuals with diabetes, the average Medicaid PMPM expenditure reduced from $1,746 to $1,652 among users between CY 2013 and CY 2017. This reduction was due to lower average fee-for-service PMPM expenditure among Medicaid beneficiaries with diabetes (from $1,362 in CY 2013 to $1,119 in CY 2017) and lower

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[29]The Hilltop Institute. (2016, May 20). *Briefing Report: An Examination of Service Utilization and Expenditures among Adults with Diabetes Enrolled in Maryland's Medicaid Managed Care Program*. Baltimore, MD: UMBC. Retrieved from:
https://www.medchi.org/Portals/18/files/pdfs/Hilltop%20Briefing%20Report_Medicaid%20Diabetes%20Analysis_Final_5-20-16.pdf?ver=2016-10-27-143345-240.

[30] Diabetes Care 2018 Mar; dci180007.

[31] Id fn 28

[32] The average Medicaid expenditure does not adjust for participants for the length of enrollment in Medicaid (*i.e.*, the costs for the one cohort could be higher because the cohort is enrolled for longer periods in Medicaid and has more opportunity to receive services). The PMPM method adjusts for length of Medicaid enrollment.

average PMPM capitation and kick payments for beneficiaries with diabetes enrolled in the HealthChoice managed care program (from $1,031 in CY 2013 to $926 in CY 2017).[33,34]

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[33] The Hilltop Institute (2019, August 29). Analyses of Medicaid Expenditure Data for the Diabetes Action Plan, 2013-2017. Baltimore, MD: UMBC.

[34] Kick payments are supplemental funds that the Department pays to managed care organizations (MCOs) outside of their regular capitation payments to better target resources for a specific set of services or having a certain condition. For example, MCOs currently receive kick payments for the birth event and for beneficiaries receiving Hepatitis C treatment.

II. Determinants and Risk Factors for Diabetes: Opportunities for Intervention

Diabetes by Age and Sex

Diabetes is more common in older adults. In Maryland, in 2015-17 combined, about 26 percent of men and 20.2 percent of women aged 65 and older had been diagnosed with diabetes compared to about 5 percent of adults aged 35-44 (Figure 9).[35] Diabetes in older adults has been linked to reduced functional status, higher mortality, and increased risk of institutionalization.

Figure 9: Adult Prevalence of Doctor-Diagnosed Diabetes, by Age and Sex, Maryland 2015-17 (BRFSS)
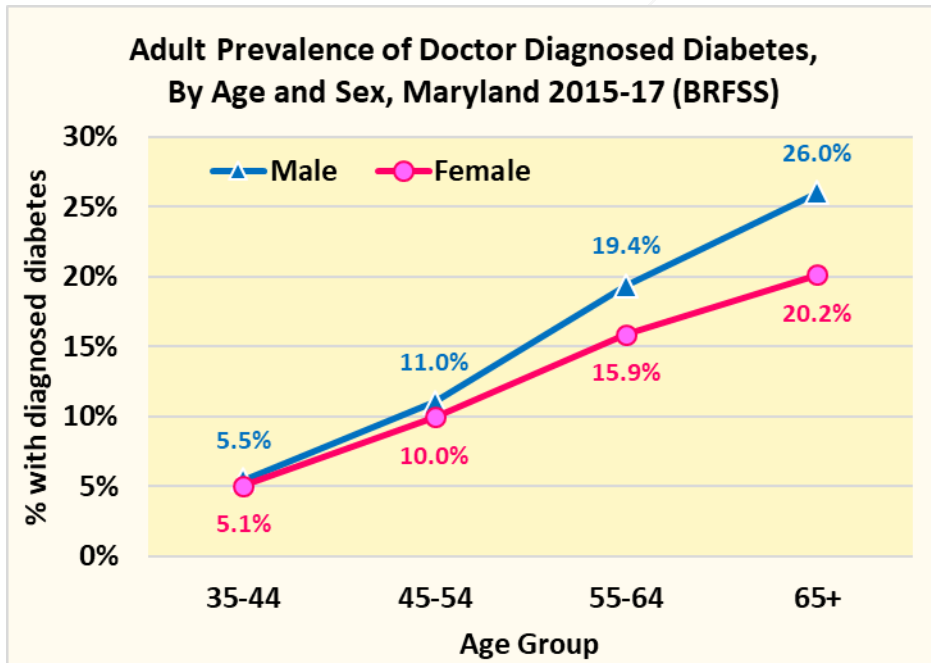
The increasing prevalence of diabetes with advancing age is part of the natural history of the disease, which means that these age differences are not an "age disparity." Obesity is more common at older ages, which increases insulin resistance, and reduction of insulin secretion also occurs at older ages.

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[35] Maryland BRFSS, 2015-17.

Age is not a modifiable factor but understanding age effects is important to evaluating other determinants and risk factors. Because of this strong age effect, the remaining analyses will display age-adjusted diabetes prevalence rates to disentangle the effects of age from the effects of other determinants and risk factors.

Gender is generally not considered to be a risk factor for diabetes. In Figure 9, above, male and female prevalence is essentially the same below age 55. While there are somewhat higher rates for males at ages 55 and older, this does not mean that females should be considered a "low risk" group.

Figure 10: Age-adjusted Adult Incidence Rate of Diagnosed Diabetes, by Sex, U.S., 1980 to 2017 (National Health Interview Survey)
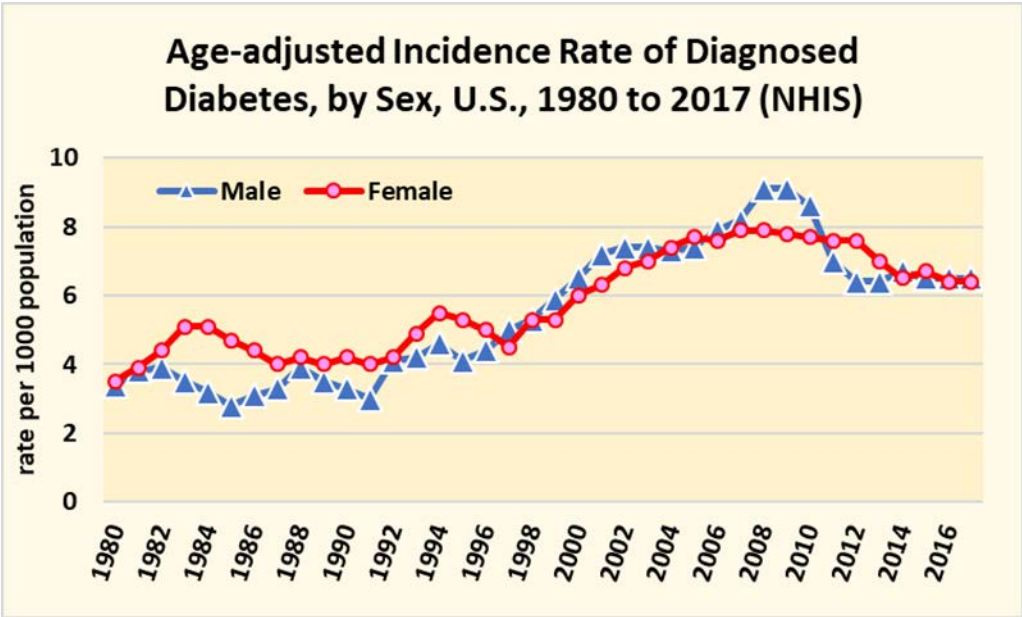
Diabetes and Weight

In Maryland, as in the nation, the prevalence of diabetes increases as weight classification moves from healthy weight, through overweight, and to obesity. As seen in Figure 11 below, in Maryland there is a small step-up in diabetes prevalence between healthy weight and overweight, and a larger step-up in prevalence between overweight and obesity. This relationship of prevalence to weight status is similar for Non-Hispanic Blacks and Non-Hispanic Whites.

In addition, Figure 11 shows that the higher diabetes prevalence for minorities presented earlier (Figure 2) persists within weight categories, with Non-Hispanic Black diabetes prevalence higher than Non-Hispanic White in all weight categories, and Hispanic and Asian prevalence higher at overweight (the only category with reportable data for those populations in this

analysis). This indicates that the racial/ethnic disparity in diabetes prevalence is not simply an issue of more excess weight in minority populations, although for some groups that contributes to the disparity.

Figure 11: Age-adjusted Adult Prevalence of Doctor-Diagnosed Diabetes, by Race/Ethnicity and Weight Status, Maryland 2015-17 (BRFSS)
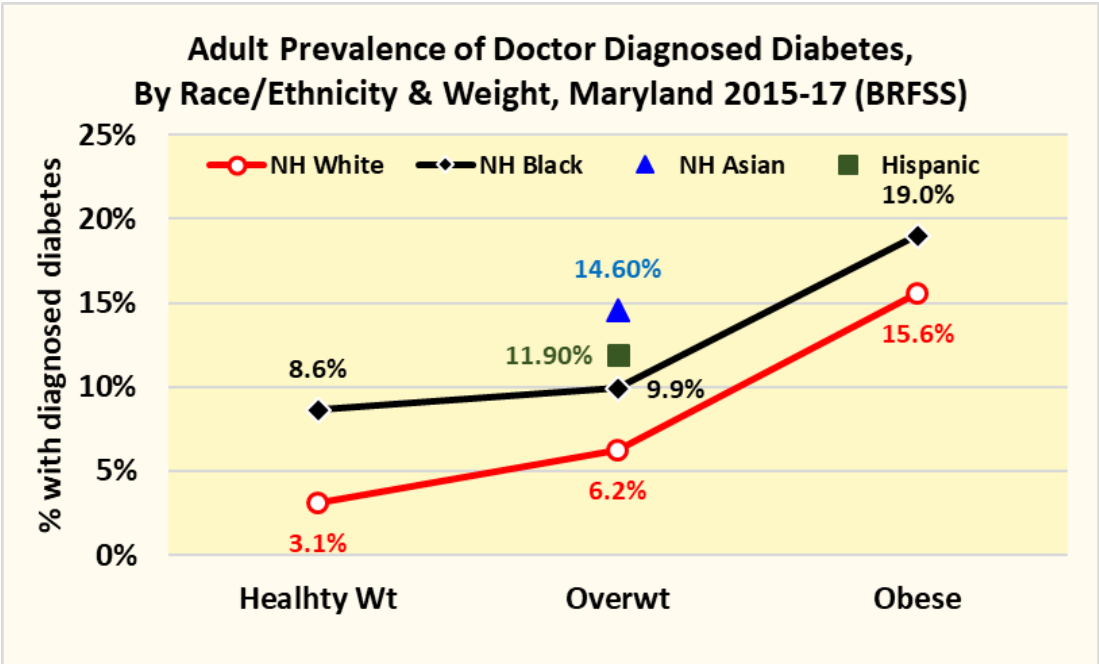
Higher BMI correlates with greater abdominal fat, and abdominal fat increases insulin resistance, which can produce high levels of blood glucose.[36] Insulin is produced by the pancreas and is the hormone that moves the sugar out of the blood and into the cells. When an individual has excess body fat, the body's cells become resistant to insulin, which is why overweight and obesity are risk factors for diabetes. The body's response to insulin-resistant cells increases insulin production to the point that the pancreas begins to fail to keep up with the insulin demand. Failure to produce and/or utilize enough insulin results in diabetes.

Adult Prevalence of Excess Weight in Maryland

Based on data from 2017, in Maryland, 34.6 percent of the population is overweight, and 30.8 percent of the population is obese.[29] Five-year trend data shows that the proportion of Marylanders who are obese is increasing, and the proportion of Marylanders who are overweight has been relatively stable. In addition, the healthy weight population in Maryland is decreasing from 35.1 percent in 2013 to 32.7 percent in 2017. [37]

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[36] NIDDK, https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-type-2-diabetes
[37] Maryland Behavioral Risk Factor Surveillance System (BRFSS), 2017.

Table 5: Trend in Age-adjusted Adult Prevalence of Weight Classification (BMI groups), Maryland 2013-2017

Adult Weight Classification by Body Mass Index (BMI) Age-Adjusted Prevalence and Trend, Maryland 2013-2017[38]					
	2013	**2014**	**2015**	**2016**	**2017**
Obese	27.6%	29.0%	28.2%	29.4%	30.8%
Overweight	35.5%	34.9%	35.7%	34.1%	34.6%
Healthy Weight	35.1%	34.5%	33.7%	34.8%	32.7%
Underweight	1.9%	1.6%	2.4%	1.8%	1.9%

Figure 12: Age-adjusted Adult Obesity Prevalence by Jurisdiction, Maryland 2015-17 (BRFSS)

Age-adjusted Adult Obesity Prevalence by Jurisdiction, Maryland 2015-17 (BRFSS)
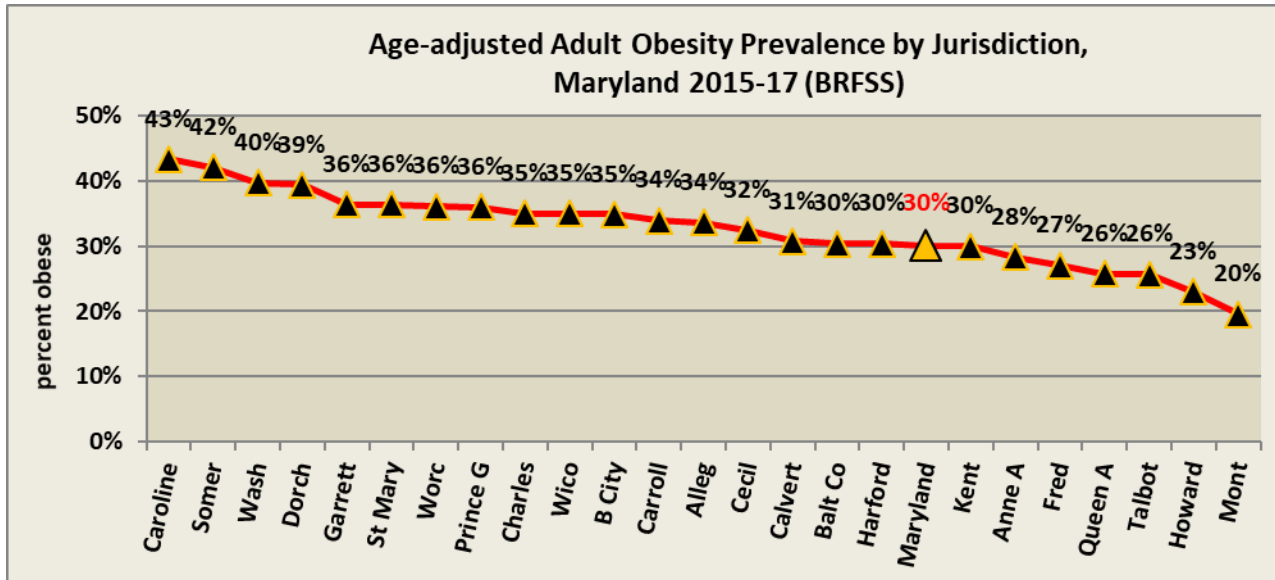
Figure 12 shows a wide range of obesity prevalence rates by jurisdiction in Maryland, ranging from a low of 20% in Montgomery County to a high of 43% in Caroline County. Several factors influence the obesity prevalence rate in a jurisdiction, including the racial and ethnic mix and the socio-economic status of the population.

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[38] Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. BRFSS Prevalence & Trends Data. https://www.cdc.gov/brfss/brfssprevalence/.

Overweight/Obesity in Women of Childbearing Age

The prevalence of overweight and obesity among women of childbearing age is of particular interest since this will determine the prevalence of pre-pregnancy diabetes and the incidence of gestational diabetes among pregnant women. Both conditions increase the risk of adverse infant and maternal outcomes.

Figure 13 below shows the weight category distribution of women age 18-44 for Non-Hispanic Whites and Non-Hispanic Blacks. For Non-Hispanic Whites, a slight majority of the women are in the healthy weight category (50.9%) while for Non-Hispanic Blacks the most prevalent weight category is obesity (40.8%). Both racial groups have similar prevalence of overweight, but very different prevalence in the healthy weight and obese categories.

Figure 13: Weight Category Distribution of Women of Childbearing Age, by Race

Maryland 2015-17 (BRFSS)
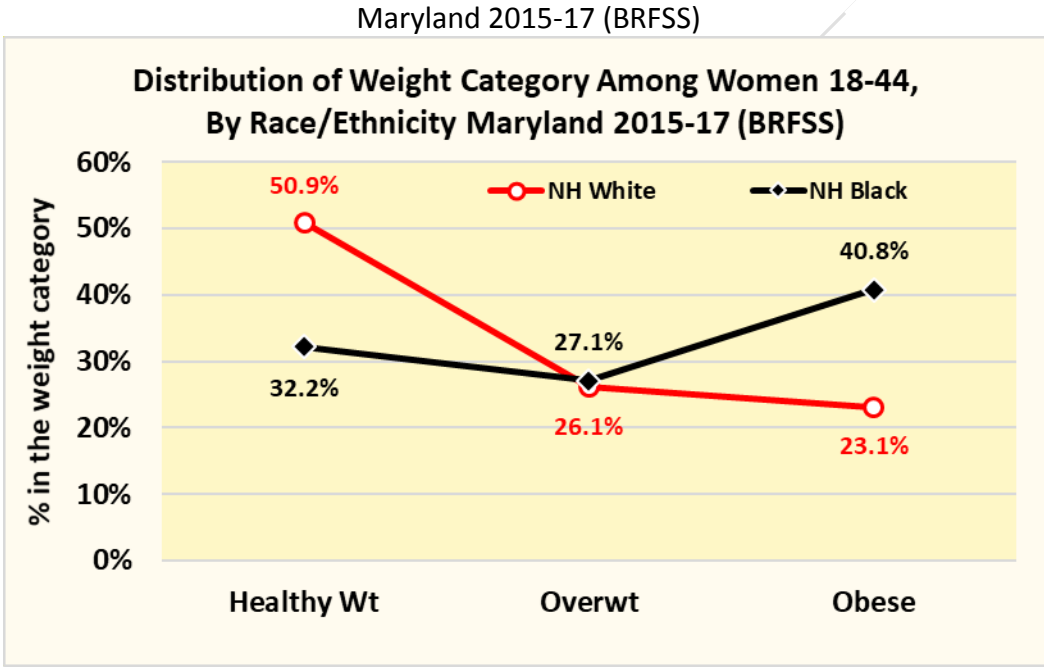
Table 6 below shows the pre-pregnancy BMI classification for pregnant women active in the Women Infants and Children (WIC) program Statewide and by jurisdiction. Statewide, 36% have an obese BMI, with a range of 29% in Montgomery and Garrett counties to 46% in Talbot, 48% in Dorchester and 61% in Somerset counties.

Table 6: Pre-pregnancy BMI of Active Pregnant Women as of October 7, 2019, Maryland WIC Program

COUNTY	Underweight BMI < 18.5	Normal Weight BMI 18.5-24.9	Overweight BMI 25.0-29.9	Obese BMI ≥ 30.0
Allegany	4%	43%	21%	32%
Anne Arundel	2%	35%	26%	36%
Baltimore City	4%	31%	24%	40%
Baltimore County	4%	35%	25%	36%
Calvert	4%	35%	28%	33%
Caroline	1%	35%	28%	35%
Carroll	6%	38%	24%	32%
Cecil	5%	36%	23%	35%
Charles	6%	35%	27%	33%
Dorchester	2%	29%	21%	48%
Frederick	3%	37%	30%	30%
Garrett	8%	44%	19%	29%
Harford	7%	31%	26%	36%
Howard	1%	35%	34%	30%
Kent	5%	30%	24%	41%
Montgomery	3%	34%	34%	29%
Prince George's	3%	31%	31%	35%
Queen Anne's	0%	35%	29%	36%
Somerset	7%	20%	12%	61%
St. Mary's	3%	33%	22%	42%
Talbot	6%	12%	36%	46%
Washington	4%	35%	21%	39%
Wicomico	3%	35%	23%	40%
Worcester	5%	32%	29%	34%
State	3%	33%	28%	36%

Total Pregnant Women = 10,015

Children and Overweight

Maryland does not have state-level data on diabetes in children. The SEARCH for Diabetes in Youth study is aimed at understanding more about diabetes among children and young adults in the United States; the incidences of both type 1 and type 2 diabetes among youths increased significantly in the 2002–2012 period, particularly among youths of minority racial and ethnic groups.[39]

State level data on overweight and obesity is available. In children and adolescents, overweight and obesity are defined by comparing weight for height (the Body Mass Index or BMI) to a reference population that precedes the recent rise in rates of childhood obesity. Comparisons are made to the corresponding age and sex of the child. Underweight is falling below the 5th percentile of that reference population, normal weight is being 5th to below 84th percentile, overweight but not obese is being 85th to below 95th percentile, and obese is being 95th percentile or above.[40]

The Maryland Youth Risk Behavior Survey (YRBS) is an on-site survey of Maryland students in a sample of middle and high school classrooms focusing on health-related behaviors and tobacco-use prevalence. The survey does not include elementary schools. The survey is conducted every two years and is self-reported. According to the 2016 Youth Risk Behavior Survey, 26.4 percent of Maryland high school students are overweight or obese.[41] The percentage of high school students who are overweight and obese were 11.5 percent and 14.9 percent, respectively. Based on this data, interventions and strategies to address overweight and obesity must be targeted to children and youth as well as adults to prevent diabetes.

The Women Infant and Children (WIC) program childhood participants (children 2 to 5 years of age, July–December 2018) have their height and weight checked during regular WIC visits. Table 6 below show that of these children, 17 percent were at or above 95th percentile BMI (obese), and 16 percent were of 85th to below 95th percentile BMI (overweight but not obese).

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[39] Incidence Trends of Type 1 and Type 2 Diabetes among Youths, 2002–2012. Elizabeth J. Mayer-Davis, Ph.D., Jean M. Lawrence, Sc.D., M.P.H., M.S.S.A., Dana Dabelea, M.D., Ph.D., Jasmin Divers, Ph.D., Scott Isom, M.S., Lawrence Dolan, M.D, Giuseppina Imperatore, M.D., Ph.D., Barbara Linder, M.D., Ph.D., Santica Marcovina, Ph.D., Sc.D., David J. Pettitt, M.D., Catherine Pihoker, M.D., Sharon Saydah, Ph.D., M.H.S., and Lynne Wagenknecht, Dr.P.H. et al., for the SEARCH for Diabetes in Youth Study*. https://www.searchfordiabetes.org.
[40] https://www.cdc.gov/obesity/childhood/defining.html
[41] Maryland Department of Health, Youth Behavior Risk Survey, 2016. https://phpa.health.maryland.gov/ccdpc/Reports/Pages/yrbs.aspx

Table 7: Prevalence of Weight Classes Among Children Participating in WIC in Maryland (by Jurisdiction, July-December 2018; 40,935 Total Children)

County	Under WT BMI <5th Percentile	Healthy WT BMI between 5th to < 84th percentile	Overweight BMI between 85th to < 94th percentile	Obese BMI ≥ 95th percentile
Maryland	**3%**	**63%**	**16%**	**17%**
Allegany	3%	67%	17%	13%
Anne Arundel	3%	65%	17%	14%
Baltimore City	3%	70%	15%	12%
Baltimore	3%	62%	17%	18%
Calvert	4%	62%	15%	20%
Caroline	3%	68%	15%	14%
Carroll	3%	58%	18%	21%
Cecil	1%	69%	15%	16%
Charles	5%	63%	18%	15%
Dorchester	3%	60%	18%	19%
Frederick	3%	62%	17%	18%
Garrett	5%	68%	15%	12%
Greater Baden	5%	62%	14%	18%
Harford	4%	69%	14%	13%
Howard	3%	64%	15%	17%
Johns Hopkins	3%	65%	14%	17%
Kent	4%	66%	16%	14%
Montgomery	2%	59%	18%	21%
Prince Georges	4%	62%	15%	18%
Queen Anne's	1%	64%	13%	22%
Somerset	7%	63%	13%	17%
St. Mary's	3%	67%	17%	13%
Talbot	1%	66%	15%	18%
Washington	4%	62%	18%	16%
Wicomico	4%	64%	15%	17%
Worcester	2%	67%	14%	17%

Diabetes and Physical Activity

Sedentary Lifestyle

The Physical Activity Guidelines for Americans encourages adults to move more and sit less. Adults should get at least 150 minutes of physical activity each week and children should be active for at least 60 minutes a day (preschool children should be moving throughout the day).[42] A sedentary lifestyle puts individuals at increased risk for developing a variety of chronic health conditions, including type 2 diabetes. Research shows that an active lifestyle reduces the risk of chronic health conditions like diabetes. The adult prevalence of diagnosed diabetes is higher in those who do not meet weekly physical activity guidelines compared to those who do meet those guidelines (Figure 14).[43]

Figure 14: Crude Adult Prevalence of Diagnosed Diabetes by Physical Activity Status and Race, Maryland 2011-13 (BRFSS)
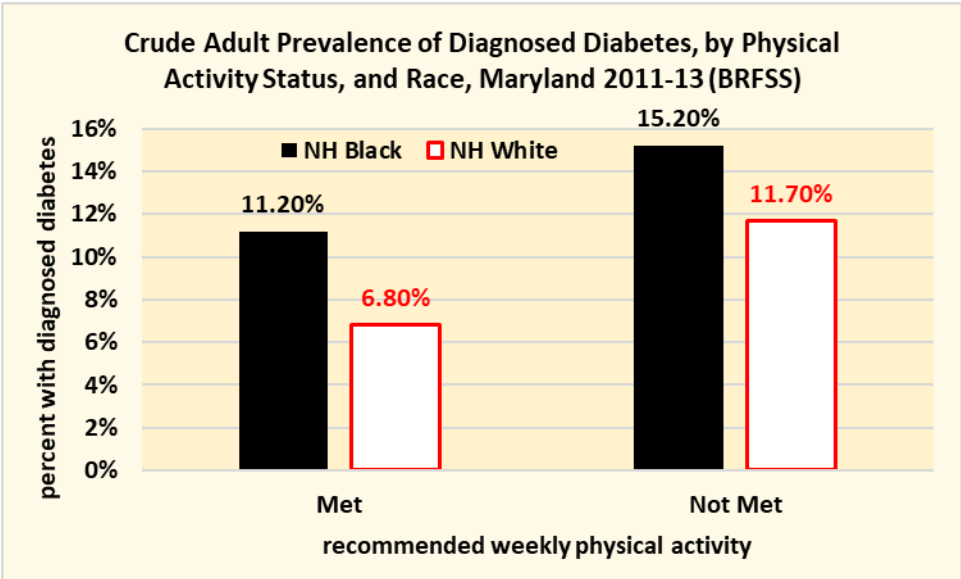
The pattern of lower diabetes prevalence in persons getting more physical activity is seen for both Non-Hispanic Whites and Non-Hispanic Blacks.

With physical activity being a determinant of diabetes risk, the distribution of physical activity participation across the State is important to program planning. In Maryland, adults without diabetes were more likely to participate in at least 150 minutes of moderate physical activity each week (51.9 percent) versus those with diabetes (44.2 percent). Meeting the physical

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[42] https://www.cdc.gov/physicalactivity/index.html
[43] Maryland BRFSS 2011-13

activity recommendation is more common for Non-Hispanic Whites and Blacks compared with Hispanics.[44] The jurisdiction-specific prevalence of meeting the 150 minute per week physical activity recommendation is mapped in Figure 15 below.

Figure 15: Age -adjusted Prevalence of 150 Minutes per Week of Physical Activity (Maryland BRFSS 2017)
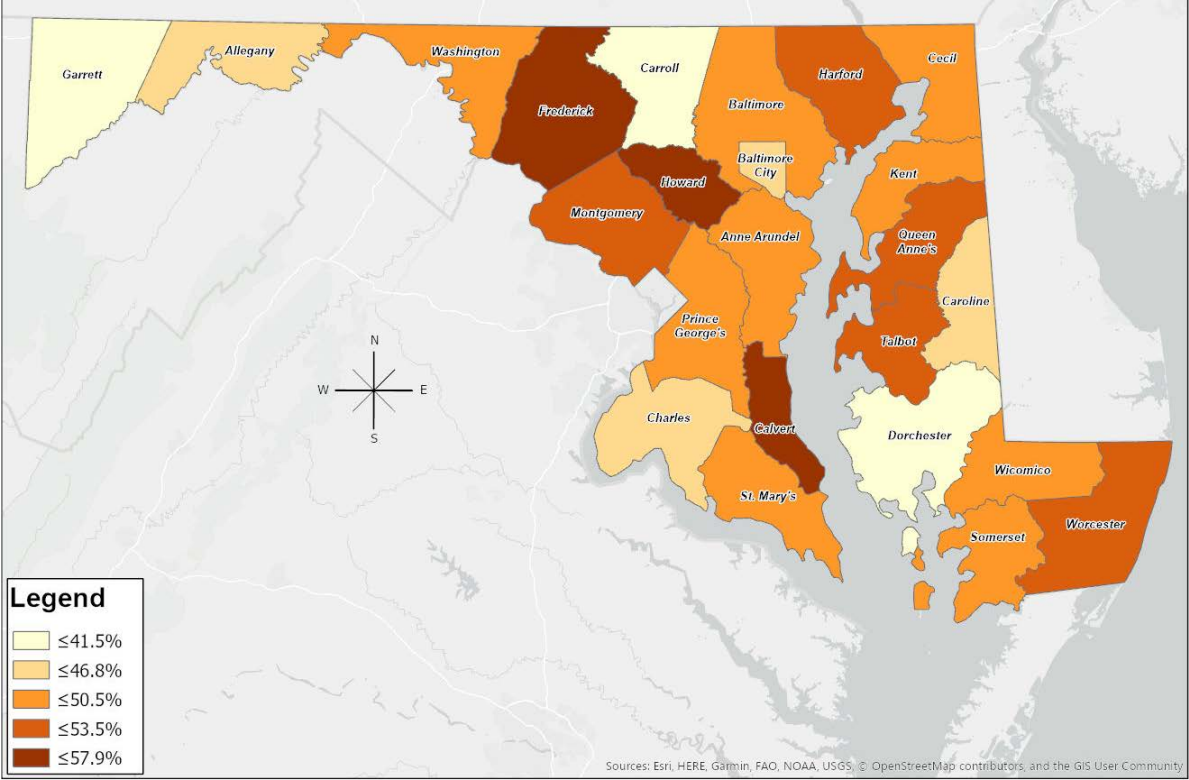
Diabetes and Tobacco

Smokers have a 30% to 40% higher risk of developing diabetes compared to non-smokers.[45] Studies have shown that smoking can increase blood sugar levels and decrease the body's ability to use insulin. People with diabetes who smoke need larger doses of insulin to control their blood sugar than those who do not smoke. Smoking can increase the risk of certain diabetes complications,[46] particularly the large blood vessel effects related to atherosclerosis (cholesterol deposits). These complications are heart disease, heart attacks, stroke, peripheral vascular disease, and amputations.

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[44] Maryland BRFSS 2017
[45] https://www.cdc.gov/tobacco/campaign/tips/diseases/diabetes.html
[46] https://www.cdc.gov/diabetes/library/features/smoking-and-diabetes.html

In Maryland, the adult prevalence of diagnosed diabetes is higher in current and former smokers than it is in non-smokers (Figure 17): about 8.8% of non-smokers have diagnosed diabetes, compared to 11.0% and 10.3% of former and current smokers, respectively.[47]

Figure 16: Age-adjusted Adult Prevalence of Diagnosed Diabetes by Smoking Status, Maryland 2015-17 (BRFSS)
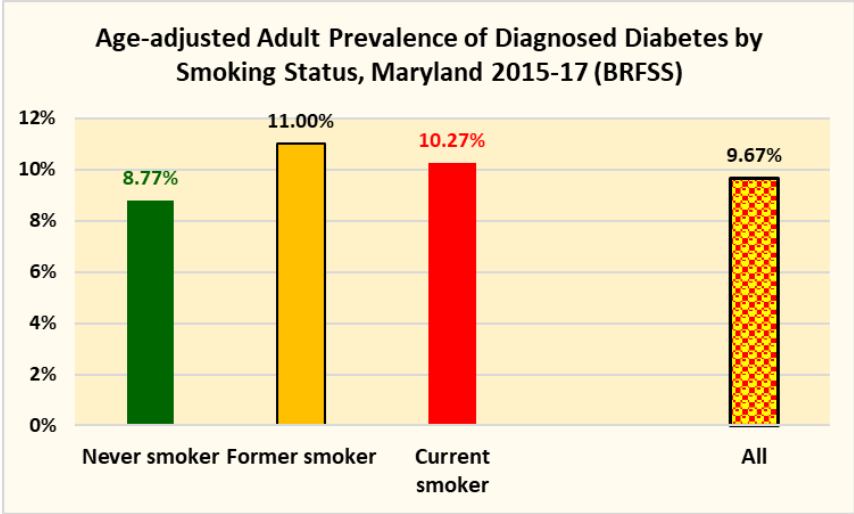
Because smoking is a synergistic cause with diabetes for large blood vessel complications (heart attacks, strokes, leg artery blockage and amputations), smoking is an important risk factor to target among persons with diabetes. In 2017, 17.9% of Maryland adults with diabetes were current smokers, compared to the 13.9% proportion of current smokers among adults without diabetes (Figure 18).[48]

Figure 17: Age-adjusted Adult Prevalence of Current Smoking, by Diabetes Status, Maryland 2017 (BRFSS)

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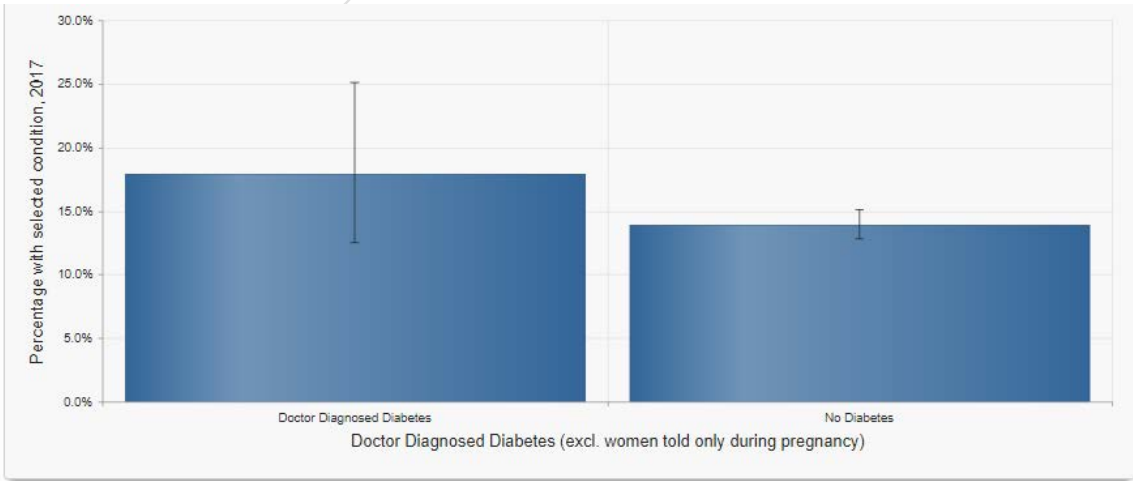
[47] Maryland BRFSS 2015-2017
[48] Maryland BRFSS 2017

The Maryland Department of Health manages the MD Quitline, a free service for Maryland residents 13 years and older to help quit tobacco use. The MD Quitline tracks information about smokers with diabetes. In fiscal year 2019, approximately, 1,500 of Quitline participants reported being told by a provider they have prediabetes, 160 participants reported type 1 diabetes and 1,000 participants reported type 2 diabetes. In fiscal year 2019, the Quitline was used by a total of 8,155 phone participants and 1,340 web participants.

Diabetes and Oral Health

Diabetes impacts almost every part of the body and can result in many complications, including the increased likelihood of oral health complications. The American Dental Association has identified periodontal disease as the most common dental disease affecting those living with diabetes, affecting nearly 22 percent of those diagnosed. This is especially true with increasing age. Poor blood sugar control increases the risk for gum problems. People with diabetes are twice as likely to develop periodontitis and periodontitis can also elevate blood sugar levels.[49]

Periodontal disease is more common in people with diabetes, so people with diabetes need to be especially diligent about getting regular dental examinations.[50] According to the CDC, diabetes can increase the risk of periodontitis for the following groups:
• Among young adults, those with diabetes have about twice the risk of developing periodontitis as those without diabetes.
• Adults ages 45 or older with poorly controlled diabetes (A1C >9 percent) are 2.9 times more likely to have severe periodontitis than those without diabetes.
• People who smoke and have persistently elevated glucose levels have a 4.6 times greater risk for developing periodontitis.[51]

Elevated glucose levels in the mouth can also cause pain, infection and associated problems in the mouth, potentially affecting the teeth, gums, jaw, and tissues such as the tongue, the roof and bottom of the mouth, and the inside of the cheeks. When diabetes is not controlled, high glucose levels in saliva help harmful bacteria grow. These bacteria combine with food to form plaque. Plaque can cause a variety of oral diseases ranging from gum disease and bad berth to bone loss, and tooth decay or cavities. Gum disease can be more severe and take longer to heal if you have diabetes. In-turn, having gum disease can make your glucose hard to control.[52]
Research continues to show that bi-directional relationship between periodontal disease and diabetes. People with diabetes have a higher prevalence of periodontal disease and those with untreated periodontal disease have challenges with glycemic control.[53]

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[49] "The Economic Burden of Elevated Blood Glucose Levels in 2012," Diabetes Care, December 2014, vol. 37.
[50] Centers for Disease Control and Prevention. National diabetes fact sheet: National estimates and general information on diabetes and prediabetes in the United States, 2011. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2011.
[51] American Dental Association, https://www.mouthhealthy.org/en/az-topics/d/diabetes
[52] National Institute of Diabetes and Digestive and Kidney Diseases, https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/gum-disease-dental-problems
[53] Preshaw PM, Alba AL, Herrera D, et al. Periodontitis and diabetes: a two-way relationship. Diabetologia. 2012; 55(1):21–31. doi:10.1007/s00125-011-2342-y.

Diabetes and Income

The prevalence of diabetes is strongly determined by income. As seen in Figure 18 and Figure 19 below, prevalence of diagnosed diabetes is higher for adults with income below $15,000 compared to adults with income at or above $75,000. [54]

This gradient of higher diabetes prevalence at lower levels of income is seen in all three weight classifications (healthy weight, overweight and obese). In addition, Figure 18 shows that for every level of income, diabetes prevalence is higher for the obese weight group. Education and weight status are independent determinants (causes) of diabetes.

Figure 18: Age-adjusted Prevalence of Doctor Diagnosed Diabetes, By Income and BMI Status (Maryland BRFFS 2015-2017)
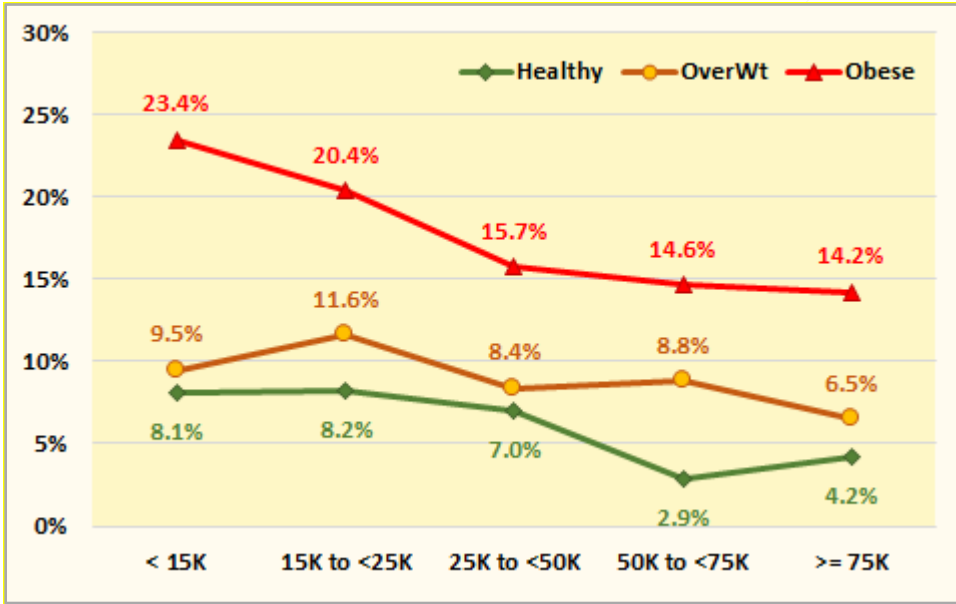
This gradient of higher diabetes prevalence at lower levels of income is also seen in both Non-Hispanic Blacks and Non-Hispanic Whites. In addition, Figure 19 shows that for every level of income, Non-Hispanic Black diabetes prevalence is higher than Non-Hispanic White diabetes prevalence. This means that income does not fully explain the disparity in diabetes prevalence between Non-Hispanic Blacks and Non-Hispanic Whites.

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[54] Maryland BRFSS, 2015-17.

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Figure 19: Age-adjusted Adult Prevalence of Doctor Diagnosed Diabetes, by Income and Race, Maryland 2015-17 (BRFSS)

Age-adjusted Prevalence of Doctor Diagnosed Diabetes, By Income and Black or White Race, Maryland 2015-17 (BRFSS)
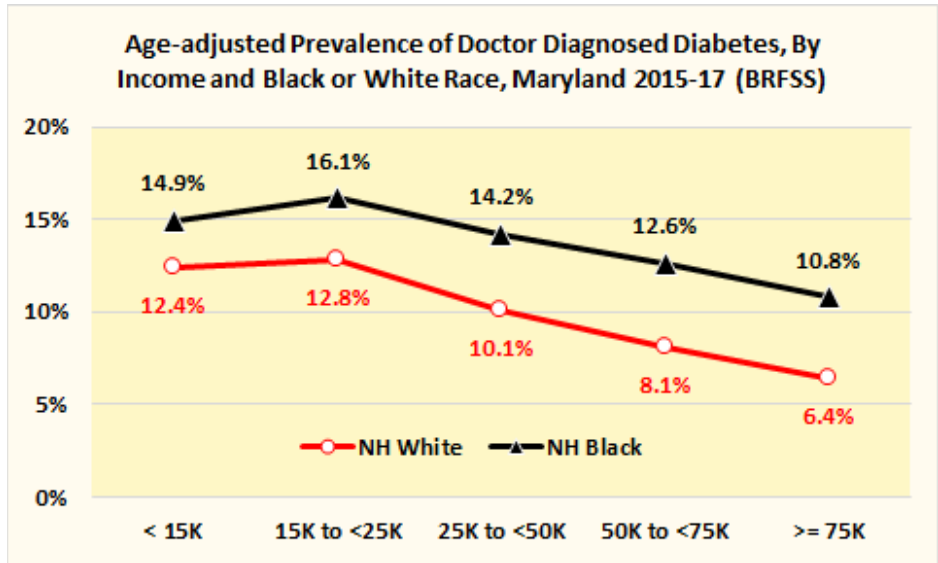
While income does not fully explain the disparity between Non-Hispanic Blacks and Non-Hispanic Whites, it does contribute to the disparity. Figure 20 shows that Non-Hispanic Blacks are about half as likely (28%) to have a household income at or above $75,000 compared to Non-Hispanic Whites (47%). Non-Hispanic Blacks have more diabetes at every income level and are more likely to be in the lower income categories that have higher risk.

Figure 20: Distribution of Household Income by Black or White Race, Maryland 2011-13 (BRFSS)
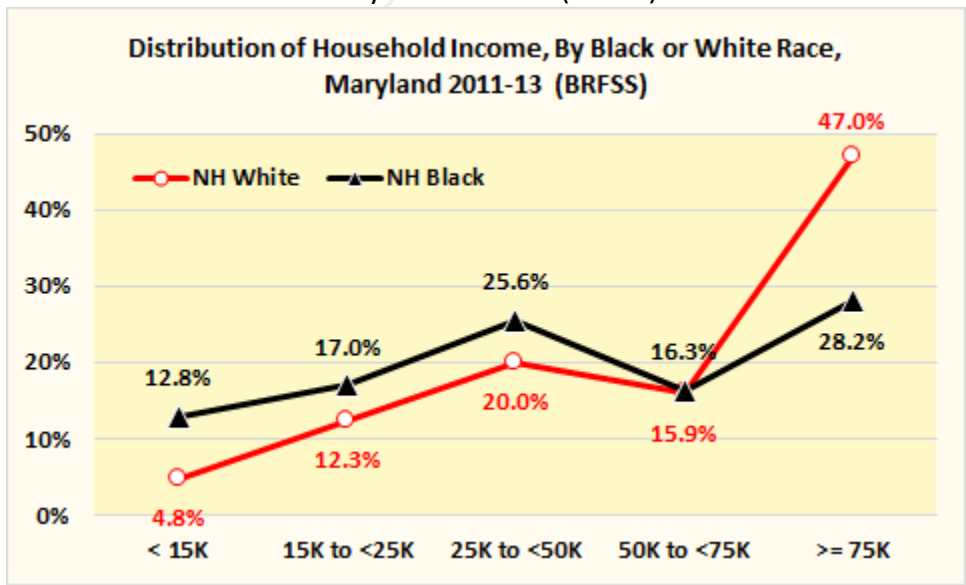
Distribution of Household Income, By Black or White Race, Maryland 2011-13 (BRFSS)

Diabetes and Level of Education

The prevalence of diabetes is strongly determined by level of education. As seen in Figure 21 below, adult prevalence of diagnosed diabetes is more than twice as high for persons with less than high school education compared to persons with a college degree or more education.

This gradient of higher diabetes prevalence at lower levels of education is seen in both Non-Hispanic Blacks and Non-Hispanic Whites. In addition, Figure 20 shows for every level of education, Non-Hispanic Black diabetes prevalence is higher than Non-Hispanic White diabetes prevalence. This means that education does not fully explain the disparity in diabetes prevalence between Non-Hispanic Blacks and Non-Hispanic Whites.

Figure 21: Age-adjusted Adult Prevalence of Diagnosed Diabetes, by Education and Black or White Race, Maryland 2015-17 (BRFSS)
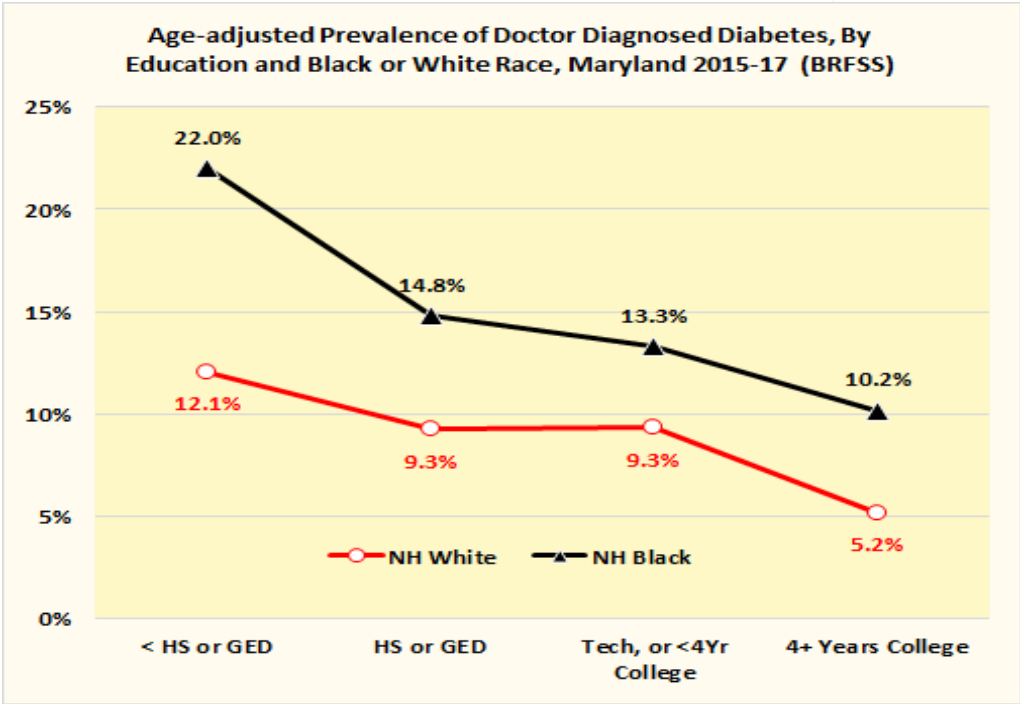
Level of education does contribute to the Black vs. White disparity in diabetes prevalence since Non-Hispanic Whites are more likely than Non-Hispanic Blacks to have four or more years of college/graduate school education, as shown in Figure 22 below. About 37% of the Non-Hispanic White adult population has a college degree, compared to only about 25% of the Non-Hispanic Black population.

Figure 22: Distribution of Education Level, for NH Black and NH White Adults, Maryland 2011-13 (BRFSS)
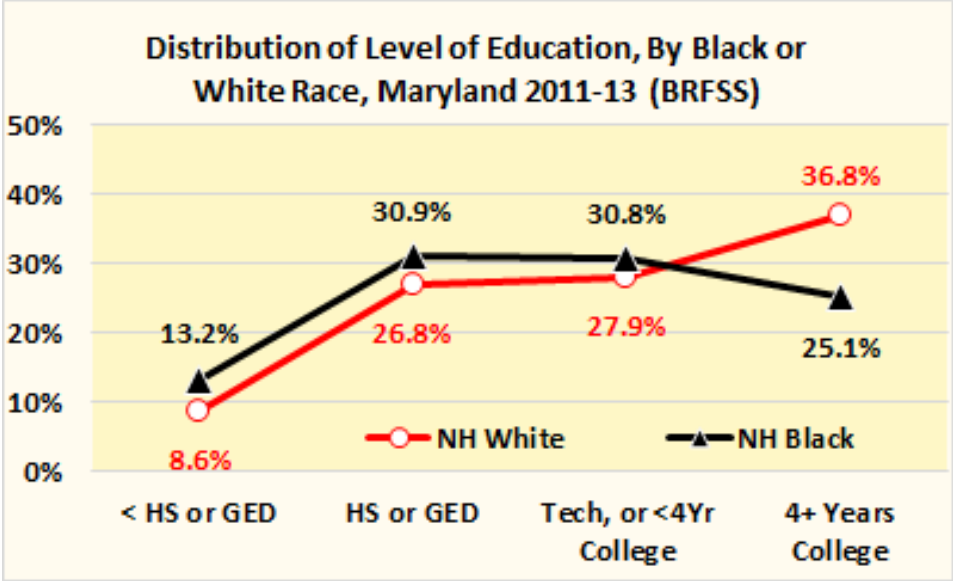
In addition to Non-Hispanic Blacks having higher diabetes prevalence at each level of education, Non-Hispanic Blacks are more likely to have the lower levels of education, which have higher risk.

Income and education are closely related to each other, with higher educational attainment being associated with higher income at the population level.

Diabetes and Health Literacy

The Office of Disease Prevention and Health Promotion (ODPHP) of the US DHHS defines health literacy as follows in its 2010 National Action Plan to Improve Health Literacy:

"Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions. Limited health literacy affects people of all ages, races, incomes, and education levels, but the impact of limited health literacy disproportionately affects lower socioeconomic and minority groups. It affects people's ability to search for and use health information, adopt healthy behaviors, and act on important public health alerts. Limited health literacy is also associated with worse health outcomes and higher costs."[55]

Limited health literacy has a variety of negative impacts on health. The ODPHP plan describes how limited health literacy reduces the use of preventive services (mammograms, flu shots,

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[55] U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. (2010). National Action Plan to Improve Health Literacy. Washington, DC:

etc.), and impairs the management of chronic conditions such as diabetes. Limited health literacy is also associated with higher rates of preventable hospital visits and admissions.

One example of a successful intervention to address limited health literacy in diabetes is the IDEALL (Improving Diabetes Efforts Across Language and Literacy) Project at San Francisco General Hospital. If found that providing patients with weekly phone calls via an automated telephone diabetes management system is effective at addressing the literacy and language needs of high-risk diabetes patients and enhancing self-management. Demonstrating improvements in communication and self-efficacy at a modest cost, especially among low-literate and LEP populations, IDEALL has proved to be an innovative approach to transforming the health care delivery system.

Diabetes and Disability

A disability is any condition or impairment of the body or mind that makes it more difficult for the person with the condition to do certain activities and interact with the world around them.[56] More than 21 million US adults 18–64 years of age have a disability. These are adults with serious difficulty walking or climbing stairs, hearing, seeing, or concentrating, remembering, or making decisions. [57,58] Disability and diabetes are interrelated.

The adult prevalence of diagnosed diabetes in Maryland is consistently about twice as high among persons with mobility, cognitive, hearing, vision, self-care, or independent living disabilities compared to persons without those disabilities (Figure 22). In some cases, disability may cause the diabetes, as in the situations where the disability limits physical activity and thus increases the risk of overweight or obesity. In other cases, the disability may be the result of the diabetes, for example when diabetes causes vision loss and produces vision disability. It is also possible that in some cases, a factor that causes both diabetes and a disability will result in the two conditions occurring together, even without a causal relationship between the diabetes and the disability in that case.

People with disability who have a diagnosis of diabetes often have higher rates of unemployment, absenteeism on the job, and health care utilization, and lower income levels and capabilities in personal care and activities of daily living.[59]

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[56] https://www.cdc.gov/ncbddd/disabilityandhealth/disability.html
[57] https://www.cdc.gov/vitalsigns/disabilities/index.html
[58] Health and Human Services Data Collection Standards for Disability Status: http://aspe.hhs.gov/datacncl/standards/ACA/4302
[59] Maryland Vital Statistics Annual report (2017): https://health.maryland.gov/vsa/Documents/Reports%20and%20Data/Annual%20Reports/2017annual_revised.pdf

Figure 23: Age-adjusted Adult Prevalence of Doctor Diagnosed Diabetes, By Presence or Absence of Selected Disabilities (Maryland BRFSS 2015-2017)
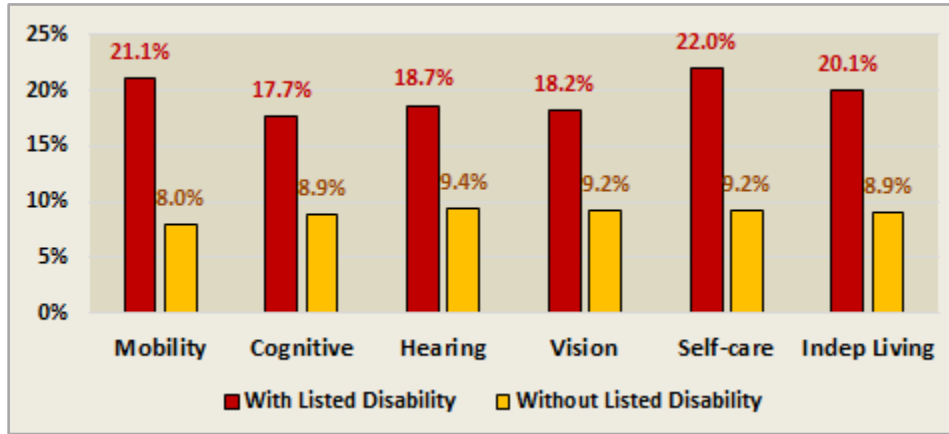
Diabetes and Mental Health

Research shows that people with diabetes are at increased risk for diabetes distress, which refers to the negative emotional and psychosocial worries and burden individuals with the diagnosis of diabetes experience. Diabetes distress could manifest as depression, anxiety disorders, eating disorders, inappropriate stress responses, substance use disorders, and alcohol abuse.[60]

The relationship of a diagnosis of depression with a diagnosis of diabetes among adults in Maryland is shown in Figure 23 below: the percent ever diagnosed with depression is about twice as high for adults with a diagnosis of diabetes (34%) as for adults without a diagnosis of diabetes (17%).

People who have mental health conditions are at an increased risk for developing diabetes and untreated mental health conditions can make the management of diabetes more difficult. People with untreated mental health conditions often deal with issues like poor self-care, improper nutrition, barriers to accessing primary care and mental health care, and lack of exercise. Mental illness reduces the likelihood a person with diabetes will be properly treated.[61]

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[60] Frayne, S.M., Halaynch, J.H., Miller, D.R., Wang, F., Lin, H., Pogach, L., et al. (2005). Disparities in diabetes care: Impact on mental illness. Archives of Internal Medicine, 165, 2631-2638
[61] Disability in Diabetics, Thomas Songer, PHD, Chapter 12, 1996

Figure 24: Age-Adjusted Percent of Adults Ever Diagnosed with Depression, by Diagnosed Diabetes Status, Maryland 2017 (BRFSS)
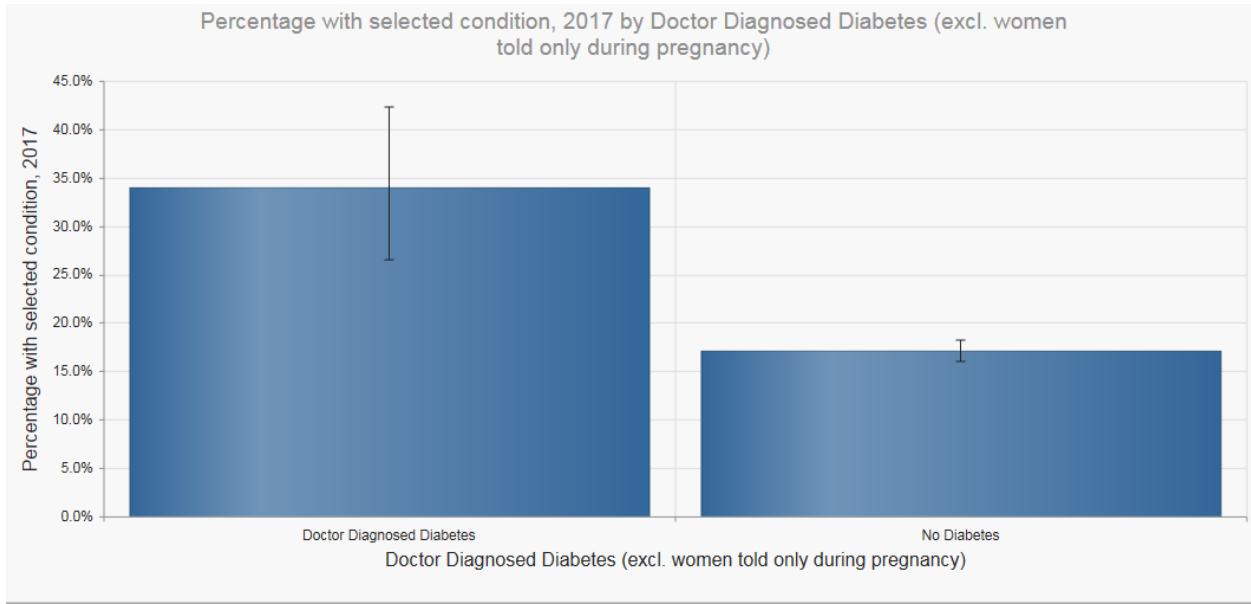
Gestational Diabetes

Gestational diabetes is diabetes that starts during pregnancy and occurs when a pregnant woman is not able to make and use all the insulin needed during pregnancy, which results in high blood sugar. Pregnant women with gestational diabetes tend to have larger babies, and mothers have an increased risk of high blood pressure and infections during pregnancy. Women with a history of gestational diabetes are at risk of developing gestational diabetes for future pregnancies. Although gestational diabetes usually resolves after pregnancy, women who have gestational diabetes in their pregnancies are at an increased risk for developing type 2 diabetes later in life.[62]

Providers usually test for and identify gestational diabetes between the 24th and 28th weeks of pregnancy.[63] In Maryland, the rate of gestational diabetes increased from 5.4 percent in 2013 to 7.3 percent in 2017, and has far-reaching consequences for the health of women, as well as the health of their babies by increased risk for diabetes.[64] Factors such as multiple pregnancies and being overweight or obese at the beginning of the pregnancy greatly increase the risk of gestational diabetes.[60]

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[62] NIDDK, https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-type-2-diabetes
[63] ACOG Releases Planline on Gestational Diabetes, American Family Physician, 2014 Sept 15; 90(6): 416-417
[64] Percentage of Women Delivering a Live Birth Who Developed Gestational Diabetes, Maryland Vital Statistics, 2013-2017.

Prediabetes

Prediabetes is a condition where blood sugar levels are higher than normal, but not high enough to be considered diabetes.[1] Prediabetes is a precursor condition on the pathway from normal glucose levels to type 2 diabetes; the development of type 1 diabetes is usually so rapid that there is no "prediabetes" state that precedes type 1 diabetes. A fasting glucose level of 100 to 125 mg/dL, a hemoglobin A1C level of 5.7% to 6.4%, or a two-hour glucose level in an oral glucose tolerance test of 140 to 199 mg/dL defines prediabetes. [65]

Prediabetes often goes unrecognized by both individuals and their health care providers; nine of 10 adults who have prediabetes do not know they have it.[66] CDC estimates that 34 percent of U.S. adults have prediabetes.[67] Diabetes and prediabetes are serious conditions that can lead to complications including heart disease and stroke, blindness, amputations, nerve damage, and kidney disease.[1]

Prediabetes and gestational diabetes indicate higher risk for the development of diabetes, as well as higher risk for some other bad health outcomes. While prediabetes and gestational diabetes *per se,* they represent points in the chain of progression to diabetes that are very near to crossing the threshold to a diagnosis of diabetes. More information on these interventions for these conditions is found in Section III.

Social Determinants of Health and Diabetes Risk

Social Determinants of Health (SDOH) are the conditions in which people are born, grow, live, work and age. SDOH have an impact on many chronic diseases like diabetes.[68] The Maryland data above show an increased prevalence of diabetes among people with lower levels of income and education, and among racial and ethnic minorities. People in these categories often may not have the financial means to pay for healthier foods, may struggle with food security, and may not have safe areas for physical activity. The stress related to poverty and racism has physiologic effects that can promote the progression to diabetes as well as impacting diet and physical activity behaviors. All these societal issues affect a person's health.[69] Figure 25 below depicts the five main categories of social determinants of health which is the framework used by Healthy People 2020.[70]

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[65] https://www.cdc.gov/diabetes/basics/getting-tested.html
[66] https://www.cdc.gov/diabetes/basics/prediabetes.html
[67] Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2017.
[68] https://www.cdc.gov/socialdeterminants/index.htm
[69] https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health
[70] https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health

Figure 25: Social Determinants of Health

Source: Healthy People 2020, Office of Disease Prevention and Health Promotion

Diabetes and Health Equity

Healthy People 2020 defines *health equity* as the "attainment of the highest level of health for all people. Achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and health care disparities." [71]

Healthy People 2020 defines a *health disparity* as "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion."[72]

The Maryland data presented above have shown differences in diabetes prevalence in high burden populations, such as by age, by race/ethnicity, by geography, by level of income and by level of education. Differences by other factors likely exist as well, which cannot be documented in our current data systems.

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[71] https://www.healthypeople.gov/2020/about/foundation-health-measures/Disparities
[72] https://www.healthypeople.gov/2020/about/foundation-health-measures/Disparities

Determinants such as poor diet, low physical activity, overweight/obesity, and high chronic stress drive physiologic changes that lead to diabetes. Social determinants such as income, education, housing, unsafe neighborhoods, food insecurity, lack of transportation, and lack of health care access drive differences in diet, activity, stress and preventive care regardless of race. Finally, racial injustice has produced persistent disadvantage in social determinants of health for racial and ethnic minority populations, creating racial/ethnic disparities in diabetes outcomes.

The data presented above suggest the following multiple opportunities to intervene to move toward health equity with respect to diabetes incidence, morbidity and mortality.

Factors on which to intervene include:

The physiologic determinants of diabetes[73]:
- Unhealthy diet
- Low physical activity
- Stress

The social determinants of diabetes[74]:
- Income
- Education
- Housing
- Unsafe neighborhoods
- Food insecurity
- Lack of transportation
- Lack of health care access

Populations to target with interventions on the factors listed above:

- Certain racial/ethnic minority populations
- Certain urban populations
- Certain rural populations
- Low income population
- Low educational attainment population
- The population with mental health conditions
- The population with disabilities

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[73] Kolb H. and Martin S. Environmental/lifestyle factors in the pathogenesis and prevention of type 2 diabetes. BMC Medicine. July 2017; volume 15,131. doi:10.1186/s12916-017-0901-x.

[74] Walker RJ, Strom Williams J, Egede LE. Influence of race, ethnicity and social determinants of health on diabetes outcomes. Am J Med Sci. 2016;351: 366-373.

III. Intervention Strategies and Actions Steps for Diabetes Prevention and Control

Rationale Behind Four Risk Populations for Diabetes

Action Plan Framework

The natural progression of type 2 diabetes is a risk continuum from healthy weight, overweight and other risk factors, normal glucose, impaired glucose, and glucose intolerance to diabetes.[75] The Maryland Diabetes Action Plan uses a systems-thinking model approach to frame the actions and strategies needed to address all components and populations along the continuum (Healthy; Overweight/Obese; Prediabetes/Gestational Diabetes; and Diabetes and Diabetes Complications). This approach recognizes upstream factors which affect the full population (those factors that can benefit all risk level components) to those at highest risk downstream (Diabetes and Diabetes Complications) (Figure 26).[76] Using this approach can also address high burden populations (as discussed in Section II). In the systems-thinking model (Figure 1), the actions take place between the risk factors.

Figure 26: Diabetes Systems Thinking Model

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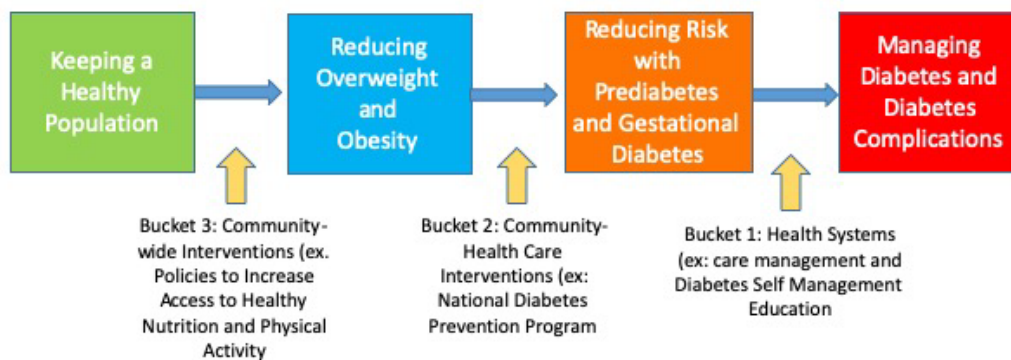
[75] Meigs, JB, Muller, DC, Nathan, DM, Blake, DR, Andres, R. The Natural History of Progression From Normal Glucose Tolerance to Type 2 Diabetes in the Baltimore Longitudinal Study of Aging. Diabetes 2003 Jun; 52(6): 1475-1484. https://doi.org/10.2337/diabetes.52.6.1475.

[76] Kim, D., https://thesystemsthinker.com/introduction-to-systems-thinking.

Using additional public health frameworks, such as the Three Buckets of Prevention, categorizes actions to be taken in healthcare, at the intersection of the community and healthcare, and at the community-wide level (Figure 27).[77] The "buckets" show sectors for action, between the health care system, the community and public health.

Figure 27: Three Buckets of Prevention
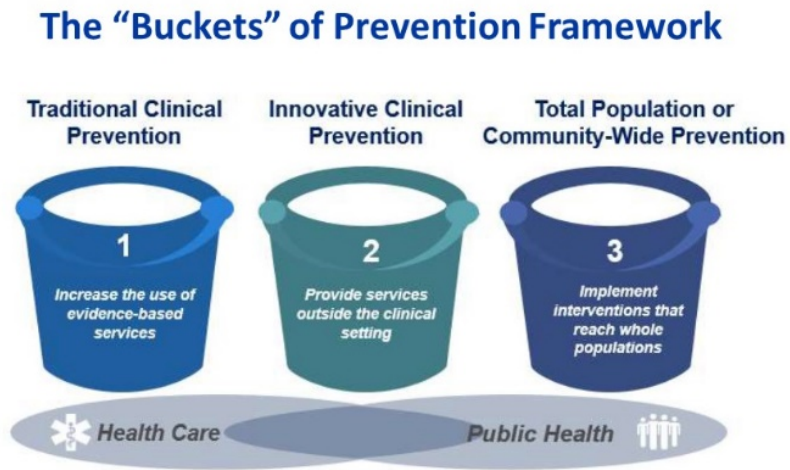
A brief description of evidence which informs the development of action steps in the four components in Section III is listed below. The vision is for all Maryland partners, across multiple sectors, to identify areas where they currently work or have the capability of working, to align their efforts to make strides in reducing diabetes burden in the state.

Interventions for the Healthy Weight Population

In Maryland, over 32.7 percent of the adult population is of a healthy weight. [78] The Keeping a Healthy Weight population actions focus on community-wide approaches, which will also impact the health of the other three population components downstream by implementing multi-faceted, multi-sector collaborations to make healthy eating and active living accessible, affordable, and convenient.

What is a Healthy Weight: Healthy weight is a weight at which an individual is considered at a low or reduced risk for adverse health conditions. Body Mass Index (BMI) is used as a screening tool to determine if an individual is overweight or obese based on their height and weight. For

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[77] Auerbach J. The 3 Buckets of Prevention. *J Public Health Manag Pract*. 2016;22(3):215–218. doi:10.1097/PHH.0000000000000381.
[78] Maryland BRFSS, 2017

adults it is a BMI of 18-24. A child whose BMI is between the 5th percentile to 84th percentile is in the healthy weight range.

Trust for America's Health and the Robert Wood Johnson Foundation recommend three guiding principles to address healthy weight (reducing obesity): 1) Promote polices and scale programs that take a multi-sector approach; 2) Adopt and implement policies that help make healthy choices easy; and 3) Invest in programs that level the playing field for all individuals and families.[79] Additionally, the movement around Health in All Policies (HiAP) recognizes that health is created by a multitude of factors beyond healthcare and, in many cases, beyond the scope of traditional public health activities.[80]

Interventions targeted at keeping all people at a healthy weight specifically creates access to healthy nutrition and physical activity, using broad and large-scale actions which include environmental change and policies to reach all citizens. For example, the 2040 Maryland Bicycle and Pedestrian Master Plan addresses actions to increase use of and access to bike and pedestrian usage in the state.[81] Other system level change actions in this component can also include improving access and polices within institutions, such as worksites and schools. Worksites can implement breastfeeding policies which include dedicated space and time for employees to breastfeed, as well as policies to increasing available healthy food options in cafeterias and working with food service vendors to supply low fat/low sodium products. Increasing farm production statewide and access to farmers markets with Electronic Benefits Transfer (EBT) access for healthy foods are actions also recommended by Trust for America's Health and the Robert Wood Johnson Foundation.[74]

Targeting healthy weight in specific populations, such as women of childbearing age, should be encouraged for preconception healthy weight.[82] Increasing breastfeeding initiation and duration have lasting benefits for infants, reducing the risk of obesity, and also reducing the risk of diabetes and other chronic diseases for mothers.[83] Healthy People 2020 targets are to increase the proportion of those infants who were ever breastfed from 74 percent to 81.9 percent, in Maryland 89.4 percent of live births were ever breastfed in 2017. [84,85]

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[79] tfah.org/stateofobesity2018. Accessed August 18, 2019.

[80] https://www.cdc.gov/policy/hiap/index.html. Accessed August 18, 2019.

[81] http://www.mdot.maryland.gov/newMDOT/Planning/Bike_Walk/Bike_Ped_Plan_Update.html. Accessed August 18, 2019.

[82] Diabetes Care. January 01 2019; volume 42 issue Supplement 1.

[83] https://www.cdc.gov/breastfeeding/about-breastfeeding/index.html, accessed August 29, 2019.

[84] https://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives, accessed August 29, 2019.

[85] Maryland PRAMS Report, 2017 Births.

Interventions for the Overweight and Obese Populations

In Maryland, over 65.4 percent of the adult population is overweight or obese, the leading risk factor in diabetes.[86] As the model moves downstream according to risk, all people in this population will be impacted by the broad actions in the Keeping a Healthy Weight component.

What is Overweight or Obesity: In children, overweight is defined as a BMI measurement greater than the 85th percentile for age and sex of the child. Obese is defined as a BMI measurement greater than the 95th percentile for age and sex. Adult overweight is defined as a BMI equal to or greater than 25, while obesity is a BMI equal to or greater than 30. In adolescents, a BMI >25/30 or above 85/95 percentile, whichever is lower. There are three classes of obesity, ranging from BMI 30-34 for Class 1, BMI 35-39 for Class 2, and BMI greater than 40 for Class 3.

In the Overweight/Obese component, the focus is to reduce the risk of diabetes by moving the population back to a healthy weight through behavior change and health system intervention for weight loss in adults and to slow weight gain in children. Action steps addressed in this component focus on specific actions which target those Marylanders who are overweight and obese, while acknowledging the action steps in the earlier Keeping a Healthy Weight component will be available to support Marylanders in the actions in this component.

Obesity is a complex, adiposity-based chronic disease, where management targets both weight-related complications and adiposity to improve overall health and quality of life. Recommendations allow for clinical decision-making for patients with obesity, which include screening, diagnosis, and evaluation, selection of therapy, treatment goals, and individualization of care with the goal of facilitating high-quality care of patients with obesity and provide a rational, scientific approach to management that optimizes health outcomes and safety.[87] Strategies for treating overweight include preventing progressive weight gain and lifestyle change; obesity treatment weight loss, lifestyle change, considering/adding pharmacotherapy and considering bariatric surgery.[88]

Providers need resources and tools to address the complicated needs of patients who are overweight or obese. Increasing use of provider billing for weight management is one strategy to help providers afford the additional time needed to counsel and refer patients. Some prescription programs which link patients to healthy lifestyles have proved successful; one

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[86] Maryland BRFSS 2017
[87] Endocr Pract. 2016;22:Supp3;1-205.
[88] Maryland Vital Statistics Annual report (2017):
https://health.maryland.gov/vsa/Documents/Reports%20and%20Data/Annual%20Reports/2017annual_revised.pdf

example is the Montgomery County Parks program which implements a park prescription program, linking health care providers and patients to parks for physical activity.[89]

Recommendations for assessing and managing childhood obesity center on prevention, structured weight management, a comprehensive multi-disciplinary approach, and if needed, tertiary care interventions. Supporting lifestyle change with the patient and the family using supports, such as a diverse team trained in motivational interviewing, is appropriate and helpful.[90]

Interventions for the Gestational Diabetes and Prediabetes Populations

Among Maryland adults who have never received a diagnosis of diabetes, 58.9 percent report having a blood sugar test in the previous three years. In Maryland residents age 45 and older, for whom risk of prediabetes is increased, 69.5 percent report having been tested in the previous three years.[91] Screening and testing rates need to be improved so providers will be able to refer at-risk people to resources to prevent progression to type 2 diabetes. Based on 2018 Maryland BRFSS data, 13 percent of Maryland adults ages 18 and older had been told they have prediabetes.[92] This number is far below the CDC estimate of 34 percent of adults ages 18 and older with prediabetes, which suggests there are many Maryland adults who have prediabetes who do not know their status.[93]

What is Prediabetes and Gestational Diabetes: Prediabetes occurs when people have elevated blood glucose (sugar) levels, which places them at higher risk for developing type 2 diabetes. This group includes people with A1C of 5.7-6.4 percent, or fasting plasma glucose between 100 and 125 mg/dL, regardless of BMI. Gestational Diabetes occurs in pregnant women who have high blood glucose levels during pregnancy with no history of diabetes mellitus prior to pregnancy. Gestational diabetes is typically tested between 24-28 weeks with Oral Glucose Tolerance Test (OGTT) levels exceeding normal range fasting, 1 hour, and 2 hours. Even if the blood glucose reduces back to normal levels after delivery, the woman has an increased risk for type 2 diabetes mellitus later in life as does the child.

It is estimated that approximately 1 in 4 people with diabetes do not know they have it.[94] In Maryland, only 13 percent of the adult population has been told they have prediabetes, however, CDC estimates that 34 percent of adults has prediabetes.[95] Screening and testing

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[89] https://www.montgomeryparks.org/about/parks/park-prescription/. Accessed August 18, 2019.

[90] https://ihcw.aap.org/resources/Documents/algorithm_brightfutures_032819.pdf. Accessed August 27, 2019.

[91] Prediabetes in Maryland—Maryland BRFSS Surveillance Brief. Vol. 1, No. 1. Baltimore, MD: Maryland Department of Health and Mental Hygiene, Center for Chronic Disease Prevention and Control, October 2016

[92] Maryland BRFSS 2018.

[93] Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2017.

[94] CDC 2017 https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf. Accessed August 18, 2019.

[95] Maryland BRFSS, 2018.

asymptomatic people for prediabetes and diabetes can be done by informally evaluating risk factors with simple prediabetes risk tests, as those available from the ADA and CDC.[96,97] Screening tools are recommended at age 45 for people with no symptoms and for people who are overweight and obese. The screening results can help determine whether blood tests are needed to further evaluate for abnormal blood sugars. Screening and testing with blood tests should be considered at any age for people who are overweight or have obesity (BMI ≥25 kg/m^2 or ≥23 kg/m^2 in Asian Americans) *and* who also have one or more of the following risk factors:

- First-degree relative with diabetes;
- High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander);
- History of cardiovascular disease;
- Hypertension (≥140/90 mmHg or on therapy for hypertension);
- HDL cholesterol level <35 mg/dL and/or a triglyceride level >250 mg/dL;
- Women with polycystic ovary syndrome;
- Physical inactivity; and
- Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans).[98]

Four blood tests are used to diagnose diabetes. The most common are the fasting blood glucose and the hemoglobin A1C, but an oral glucose tolerance test (OGTT) may also be used. The fourth diagnostic test is non-fasting blood sugar, which if over 200 mg/dL in the presence of typical signs and symptoms of diabetes, indicates diabetes. Two positive tests are required to confirm a diagnosis of diabetes, which can be two different tests on the same blood sample (such as fasting glucose and A1C from the same blood draw). Intensive adherence to authoritative clinical guidelines and use of EHR tools should be encouraged with providers and health systems.[99]

CDC estimates over 34% of the adult population has prediabetes, which translates to approximately 1.6 million adults in Maryland.[100,101] In 2017, 1.7 percent of Maryland adult women reported a history of gestational diabetes.[102] Both prediabetes and gestational diabetes significantly increase the risk of progression to diabetes.[11]

[96] https://www.diabetes.org/risk-test
[97] https://www.cdc.gov/prediabetes/takethetest
[98] Diabetes Care. January 01 2019; volume 42 issue Supplement 1.
[99] https://amapreventdiabetes.org/tools-resources
[100] CDC 2017 https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf. Accessed August 18, 2019.
[101] US Census 2016.
[102] Maryland BRFSS 2017.

Prediabetes and Diabetes Screening in Adults

Testing to detect prediabetes and diabetes is recommended for adults of any age who are overweight or obese and who have one or more additional risk factors for diabetes. For all others, especially those who are overweight, testing should begin at age 45. People with prediabetes who are at risk for type 2 diabetes can prevent or delay the disease by making modest lifestyle changes to lose five to seven percent of body weight and increasing physical activity to at least 150 minutes per week.[103] In Maryland, people with prediabetes can participate in a National Diabetes Prevention Program (National DPP). The National DPP is an evidence-based lifestyle change program designed to help participants make these lifestyle changes to avoid developing type 2 diabetes.

As the model continues to move downstream, people with prediabetes and a history of gestational diabetes will be impacted by the broad actions in the Keeping a Healthy Weight component, as well as the targeted weight control/reduction actions in the Reducing Overweight and Obesity component. In the Prediabetes/Gestational Diabetes component, the focus is to test those at risk and refer to aggressive risk reduction resources, such as the National DPP.

The original DPP study was shown to reduce the risk by 58 percent in the group who made behavior change that resulted in a 7 percent weight loss and at least 150 minutes a week of moderate physical activity. The metformin (low cost drug to lower blood glucose) group showed a 34 percent decrease.[104] The research into practice for this program demonstrated similar outcomes from small group sessions led by lay health coaches.[105] The CDC launched the National DPP in 2012 to set standards and assure fidelity and create a recognition registry of programs throughout the country. Maryland currently has 53 National DPP lifestyle programs (12 fully recognized); since 2012, 5,296 citizens participated in the program.[106]

Public payer reimbursement for the National DPP is a step toward sustainability. In April 2018, Medicare DPP services became available to eligible beneficiaries nationwide, creating a billing framework based on outcomes of participants. In 2016, Maryland Medicaid implemented a CDC-funded demonstration to implement a delivery model for the National DPP in Medicaid managed care organizations (MCOs). Four of Maryland's nine HealthChoice MCOs participated, successfully enrolling 637 enrollees into a participating CDC-recognized lifestyle change program. Key outcomes of the demonstration, which concluded in January 2019, included the creation of an eligibility algorithm, and a sustainability plan culminating in Medicaid applying to

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[103] Diabetes Prevention Program Research Group, Reduction in the Incidence of Type 2 Diabetes with Lifestyle Intervention or Metformin; N Engl J Med 2002; 346:393-403.

[104] Diabetes Prevention Program Research Group, Reduction in the Incidence of Type 2 Diabetes with Lifestyle Intervention or Metformin; N Engl J Med 2002; 346:393-403.

[105] Ackermann RT, Finch EA, Brizendine E, Zhou H, Marrero DG. Translating the Diabetes Prevention Program into the community. The DEPLOY Pilot Study. *Am J Prev Med*. 2008;35(4):357–363. doi:10.1016/j.amepre.2008.06.035.

[106] DPRP State-Level Evaluation Report, CDC, July 2019.

CMS for a Section 1115 demonstration waiver amendment that would authorize continued provision of the National DPP lifestyle change program in HealthChoice. CMS approved the waiver request in April 2019, and HealthChoice DPP will be implemented statewide effective September 1, 2019.

As the prevalence for Maryland adults who are told their prediabetes status by providers is dramatically lower (11.6 percent) than those estimated through national clinical studies, implementing mechanisms or tools within provider practice systems to increase testing for those at risk of diabetes is the first step for provider practices to essential.[107]

The Maryland Primary Care Program (MDPCP) is driving the adoption of advanced primary care in Maryland practices including management and prevention of chronic disease. Currently, practice performance is measured on critical chronic disease areas including diabetes and hypertension management. A focus of the program is aligning with the State's population health goals which includes reducing the incidence of diabetes. MDPCP is working on adding a performance measure for 2020 to drive diabetes prevention efforts that would emphasize BMI and blood glucose assessment and making subsequent referrals to evidence-based programs such as the National DPP. The MDPCP anticipates regular training for its practice coaches and the participating practices and Care Transformation Organizations, entities that provide staffing and technical assistance to practices as well as provider referral mechanisms to increase referrals.

The National Nurse Study showed an increased risk of the conversion to diabetes in those with a history of gestational diabetes.[108] Priority actions for women with gestational diabetes focus on postpartum testing to rule out undiagnosed prediabetes, or type 1 or type 2 diabetes. Postpartum continued follow-up for women with a history of gestational diabetes should include regular testing, healthy lifestyle support and potentially use of metformin.[109]

Working with the healthcare team to ensure postpartum testing of women with gestational diabetes is a standard of care practice that is underutilized. In 2016, Maryland Medicaid and Maryland Public Health engaged two MCOs to develop and implement system level tools and/or policies to ensure testing for women with a history of gestational diabetes.

Interventions for Managing Diabetes and Diabetes Complications

The American Diabetes Association (ADA) recommends population health approaches for managing diabetes be timely, evidence-based, and in collaboration with each patient.[94] Health care systems should consider using frameworks such as the Chronic Care Model (CCM) for achieving high quality care of people with diabetes which encourages six essential elements to

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[107] Maryland BRFSS 2017

[108] Kim C, Newton KM, Knopp RH. Gestational diabetes and the incidence of type 2 diabetes; a systematic review. Diabetes Care 2002;25:1862-1868.

[109] Diabetes Care. January 01 2019; volume 42 issue Supplement 1.

move health systems toward having a prepared, proactive team and an informed, activated patient. These core elements are: community resource mobilization; health system that operates with safe, high quality care as part of its culture; self-management support to strengthen decision-making and agency; delivery system design to assess what care is needed and deliver it to keep patients as healthy as possible; evidence-based decision-making and patient-centered care; and clinical information systems that are comprehensive and facilitate effective and efficient care.[110]

What is Diabetes and its Complications: This group includes people with a diagnosis that is confirmed by two tests; fasting plasma glucose over 126 mg/dL or A1C of 6.5 percent or higher, regardless of BMI. Diabetes is also diagnosed with an oral glucose tolerance test result greater than 200mg/dL or random plasma glucose greater than 200mg/dL with typical symptoms of diabetes (blurred vision, excess thirst, excess hunger, frequent urination). When not well managed or when it has been present for many years, diabetes slowly damages the blood vessels in the body and results in problems of organs or organ systems in the body, including the heart, eyes, kidneys, skin, and nerves. The resulting complications, like blindness, kidney failure, nerve pain, and extremity amputations, can be debilitating and significantly impact quality of life.[111]

Actions for managing diabetes and controlling complications are complex and rely on a team-based approach, which includes behavior change for self-care and a healthy lifestyle. Diabetes self-care requires daily decisions about food, physical activity, stress management, and daily self-monitoring of glucose levels. Self-management education facilitates the knowledge, skill, and confidence for individuals with diabetes to manage their own health, a concept known as patient activation. Self-management education is designed to help individuals adopt and sustain the necessary skills and behaviors to achieve proper diabetes self-care on an ongoing basis, and has been shown to positively affect outcomes, and all people with diabetes should participate in diabetes self-management education and support programs.[112] Telemedicine is an opportunity to improve patient access to primary care and to community supports and services, and telehealth strategies have been effective for improving patient self-activation and engagement, for increasing patient blood glucose self-monitoring and dietary adherence, and for decreasing A1C in many settings.[113,114,115]

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[110] http://www.improvingchroniccare.org/index.php?p=The_Chronic_Care_Model&s=2 Accessed July 18, 2019.

[111] Centers for Disease Control and Prevention. Put the brakes on diabetes complications. Accessed November 13, 2019 at https://www.cdc.gov/diabetes/library/features/prevent-complications.html

[112] Diabetes Care. January 01 2019; volume 42 issue Supplement 1.

[113] Siminerio L, Rubbert K, Huber K, Toledo FGS. Telemedicine for Reach, Education, Access, and Treatment (TREAT): Linking Telemedicine with Diabetes Self-management Education to Improve Care in Rural Communities, The Diabetes Educator.

[114] Ciemins E, Coon P, Peck R, Halloway B and Min SJ. Using Telehealth to Provide Diabetes Care to Patients in Rural Montana: Findings from the Promoting Realistic Individual Self-Management Program. Telemedicine Journal and e-Health. 2011 Oct; 17(8):596-602. Doi: 10.1089/tmj.211.0028.

[115] Lee SWH, Chan CKY, Chua SS, Chairyakunapruk N. Comparative Effectiveness of Telemedicine Strategies on Type 2 Diabetes Management: A Systematic Review and Network Meta-analysis. Scientific Reports. 2017 Oct4;7(1):12680. Doi: 10.1038/s41598-017-12987-z.

Managing and Controlling Diabetes

The American Medical Association and the American Diabetes Association (ADA) recommend individuals diagnosed with diabetes should be aware of how to manage their disease, and nearly all general practitioners and their staff should be trained on diabetes management. Once a person is diagnosed with diabetes, they ideally should be trained on how to monitor their blood glucose levels, administer insulin injections if necessary, take other diabetes medications, receive annual eye and foot exams, and be vaccinated for influenza, pneumonia and other vaccinations based on clinical protocols. Blood levels should be checked daily for glucose levels. In addition, A1C testing should be performed at least twice yearly in patients who have achieved stable glycemic control. For those patients who are not at goal or for whom therapy recently changed, quarterly A1C testing is recommended.[116]

According to self-reported data from BRFSS, in 2017, 10.2 percent of Maryland adults with diagnosed diabetes did not visit their doctor regularly, 4.0 percent did not have dilated eye examinations, 5.2 percent did not receive A1C testing, 21.1 percent did not have foot examinations, 31.6 percent did not receive an influenza or a pneumonia shot at any time, and 47.5 percent never attended a diabetes self-management course, which are offered regularly at hospitals and doctors' offices.[117]

Because diabetes increases the risk of cardiovascular disease two to four times more than people who do not have diabetes, cardiovascular disease is still the most common cause of death for people with diabetes.[118,119] Controlling blood pressure and monitoring cardiovascular risk factors should be part of diabetes care plans.

High blood sugar increases the level of sugar in saliva. Sugar feeds the bacteria in the mouth, and when bacteria are combined with food, it creates optimum conditions for tooth decay to occur. Additionally, people with diabetes are more likely to have gum disease, which can lead to tooth loss. Gum disease can also make blood sugar levels rise and make diabetes harder to manage. Treating gum disease can lower blood sugar over time and reduce the chance of other diabetes-related complications, such as heart disease and kidney failure.[120]

For people with diabetes, optimum management of mouth and diabetes health should include:
- Keeping blood sugar as close to target levels as possible.
- Brushing teeth at least twice a day and flossing once a day.

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[116] American Diabetes Association Clinical Planlines

[117] Maryland BRFSS, 2017.

[118] Centers for Disease Control and Prevention. National diabetes statistics report: Estimates of diabetes and its burden in the United States, 2017. Atlanta, GA: US Department of Health and Human Services; 2017. Accessed 11/14/2019 at https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf

[119] Matheus AS, Tannus LR, Cobas RA, Palma CC, Negrato CA, Gomes MB. Impact of diabetes on cardiovascular disease: an update. Int J Hypertens. 2013;2013:653789.

[120] National Institute of Diabetes and Digestive and Kidney Diseases, https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/gum-disease-dental-problems.

- If wearing dentures, removing and cleaning them daily and informing the dental provider of any denture-related soreness in the mouth.
- Getting regular dental checkups and informing the dental provider of the diabetes diagnosis.
- Stopping smoking or not starting.[121]

Many common signs of diabetes appear in the mouth, such as red swollen, tender, or bleeding gums. All signs of infection should be reported to a dental provider immediately. However, gum disease may not cause immediate pain or visible signs, so regular dental cleanings and exams every six months are essential to prevent the development of more extensive damage.[122] Research also suggests that treating gum disease can help improve blood sugar control in patients living with diabetes, decreasing the progression of disease.[123] In Maryland in 2016, approximately 68% of adults with diagnosed diabetes reported having visited a dentist in the past year.[124]

The integration of dental and medical practice can also play an important role in the management of diabetes and oral disease. The U.S. Department of Health and Human Services' Healthy People 2020 oral health objectives include increasing the proportion of adults who were tested or referred for glycemic control from a dentist or dental hygienist in the past year.[125] The promotion of medical-dental integration to reach these goals can potentially have a significant impact on reducing the prevalence of diabetes in Maryland.

IV.   Action Tables for Diabetes Prevention and Control

The interventions and action steps for the Diabetes Action Plan are targeted to keep people at a healthy weight, prevent overweight and obesity, halt diabetes progression by addressing prediabetes and gestational diabetes, and improve care for people with diabetes and better manage complications. By addressing the diabetes risk continuum with partners in all sectors across Maryland, the burden of diabetes can be reduced statewide. Because people with diabetes have high risk for cardiovascular disease, the number one cause of death in Marylanders, addressing diabetes at the population level is an important step in reducing the overall number of deaths in our state.

The Diabetes Action Team developed actions in each of the four components, and the next section contains detailed action tables. The actions are separated in two main categories— Priority State Action Steps and Suggested Action Steps for the State and its Partners. The

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[121] Centers for Disease Control and Prevention, https://www.cdc.gov/diabetes/managing/problems.html
[122] National Institute of Diabetes and Digestive and Kidney Diseases, https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/gum-disease-dental-problems.
[123] American Dental Association, https://www.mouthhealthy.org/en/az-topics/d/diabetes
[124] Maryland BRFSS, 2016.
[125] Healthy People 2020 - Oral Health Topic: OH Objective 14.3. https://www.healthypeople.gov/2020/topics-objectives/topic/oral-health/objectives

Priority action steps are those MDH has prioritized and for which MDH will assume responsibility. The "other" steps are those where partners have influence to impact change and assume a lead. Additionally, data-related Action Steps are included where there may be gaps in important diabetes data and sources.

The goals and action steps included in the plan are based on trend data, with reach objectives for each population aimed at reducing diabetes risk. For example, in the Reducing Overweight and Obese Population, the goals for the adults were identified based on trend data that show a steady increase in adult overweight and obesity; therefore the goal is based on action steps that will halt the increase in weight, and will keep the overweight/obesity population from increasing. Whereas, the high school youth overweight and obese rates trend data have remained relatively stable; therefore a goal to reduce current overweight and obese by 10% in 4 years for the youth is needed to reduce the risk of overweight and obesity in adulthood.

Healthy Weight Population	
Definition	Healthy weight is a weight at which an individual is considered at a low or reduced risk for adverse health conditions. Body Mass Index (BMI) is used as a screening tool to determine if an individual is overweight or obese based on their height and weight. For adults, it is a BMI of 18-25. A child whose BMI is between the 5th percentile to 85th percentile is in the healthy weight range.
2019-2024 Goal	**By 2024, 32 percent of Maryland adults will be of healthy weight.**
Action Step Objectives	Increase access to healthy nutrition. Achieve and maintain recommended physical activity levels for all Marylanders.
Reducing Overweight and Obese Populations	
Definition	In children, overweight is defined as a BMI measurement greater than or equal to the 85th percentile for age and sex of the child. Obese is defined as a BMI measurement greater than or equal to the 95th percentile for age and sex. Adult overweight is defined as a BMI equal to or greater than 25, while obesity is a BMI equal to or greater than 30. In adolescents, the definitions are a BMI of 25 or 30 or above 85 and 95 percent respectively, whichever is lower. There are three classes of obesity, ranging from BMI 30-34 for Class 1, BMI 35-39 for Class 2, and BMI greater than 40 for Class 3.
2019-2024 Goal	**By 2024, maintain the percentage of adults with a BMI >25 at 66.5%; and reduce by 10% percent the BMI >85th percentile in high school students.**
Action Step Objectives	Improve clinical care services for overweight and obese children and adults.

	Improve the availability of healthy lifestyle options for overweight and obese children and adults.
Prediabetes and Gestational Diabetes Populations	
Definition	Prediabetes occurs when people have elevated blood glucose (sugar) levels, which places them at higher risk for developing type 2 diabetes. This group includes people with A1C of 5.7-6.4 percent, or fasting plasma glucose between 100 and 125 mg/dL, regardless of BMI. Gestational Diabetes occurs in pregnant women who have high blood glucose levels during pregnancy with no history of diabetes mellitus prior to pregnancy. Gestational diabetes is typically tested between 24-28 weeks with Oral Glucose Tolerance Test (OGTT) levels exceeding normal range fasting, 1 hour, and 2 hours. Even if the blood glucose reduces back to normal levels after delivery, the woman has an increased risk for type 2 diabetes mellitus later in life as does the child.
2019-2024 Goal	**By 2024, increase the prevalence of Maryland adults who know their prediabetes status by 30%.**
Action Step Objectives	Improve prediabetes outcomes. Reduce risk of diabetes in women with a history of gestational diabetes.
Managing Diabetes and Controlling Diabetes with Complications	
Definition	This group includes people with two confirmed tests; fasting plasma glucose over 126 mg/dL or A1C of 6.5 percent or higher, regardless of BMI. Diabetes, when not well managed or when it has been present for many years, slowly damages the blood vessels in the body and results in problems of organs or organ systems in the body, including the heart, eyes, kidneys, skin, and nerves.
2019-2024 Goal	**By 2024 reduce the age-adjusted diabetes mortality by 5%.**
Action Step Objectives	Improve the use of standardized quality of care for people with diabetes at all levels of the health care system by increasing the number of healthcare systems statewide that utilize frameworks such as the chronic care model (CCM), as recommended by the American Diabetes Association's 2019 Standards of Medical Care in Diabetes. Reduce the number of hospitalizations and emergency department visits each by 5% for people with diabetes in the state of Maryland.

Action Steps by Partner

Table 1: Activities for Health Care Providers

Healthy Population	Overweight/Obesity	Prediabetes/Gestational Diabetes	Diabetes Management
• Utilize a statewide unified healthy nutrition messages to be used to promote knowledge and awareness of healthy eating. • Promote increased physical activity and decreased sedentary activity through collaborations and referral networks with physical activity providers in the community. • Implement strategies for healthy eating and increase physical activity as part of a population health plan. • Promote initiation of and length of breastfeeding. • Promote healthy lifestyle family planning within OB/GYN practices with women of childbearing age. • For pediatricians and adult medicine practitioners, promote the replacement of screen time with increased	• Refer overweight children and adults to appropriate evidence-based weight and lifestyle counseling. • Establish referral mechanisms to refer obese children and adults to obesity specialists for treatment. • Establish screening and documentation processes for annual BMI for children older than 2 years of age and adults. • Establish medical homes for screening and treatment of overweight/obesity for members of higher-risk groups. • Establish universal Social Determinants of Health screening tools and use of z-codes in primary care and pediatrician practices for overweight/obese patients (food insecurity, poverty, housing instability, neighborhood safety, and	• Increase number of people at risk for prediabetes who are tested, referred and complete and reach evidence-based lifestyle change program target goals. • Utilize an e-referral application within CRISP to facilitate referrals to the BeHealthyMaryland.org referral page and National DPP Lifestyle Change Programs. • Address barriers to participation in lifestyle programs (i.e. transportation, childcare, healthy food access, exercise program availability, etc.) • Implement mechanisms and tools within provider practices to test for diabetes at 4-12 weeks postpartum for women with history of gestational diabetes and	• Use a framework, such as the Chronic Care Model (CCM), clinical guidelines, EHR best practice advisories, and dashboards to achieve better compliance with routine care such as timely intervals for checking A1C and urine for proteinuria, for referring for eye/foot exams, and for addressing oral health. • Ensure patients are appropriately linked with case management. • Following the delivery system design principle of frameworks such as CCM, engage clinical team members to improve efficiency in quality care delivery by (i.e. dentists, optometrists/ophthalmologists, podiatrists, pharmacists, nurses, medical assistants, social workers, case managers, lab technicians) to achieve more intensive disease management and decrease

physical activity alternatives.	provide social and case management support). • Establish use of mobile and telehealth technology by case managers, licensed dietician nutritionists, and health care providers to monitor high risk patients to help them achieve weight management goals. • Establish nutrition counseling services via primary care and community-based providers and increase those billing for nutrition counseling. • Perform or arrange for healthy behavior screening for overweight/obese patients, including food insecurity and prescribe food and physical activity interventions for weight management.	adhere to clinical guidelines for women with a history of gestational diabetes for regular testing, healthy lifestyle support and potential use of medication to reduce risk. • Implement coordinated strategies to encourage women with a history of gestational diabetes to breastfeed. • Utilize the CRISP e-referral tools to refer women with gestational diabetes history to evidence-based lifestyle change programs or interventions. • Implement coordinated strategies to encourage women with a history of gestational diabetes to breastfeed. • Ensure adherence to clinical postpartum glucose testing guidelines for women who have a history of gestational diabetes. • Encourage bidirectional referral systems between dentists and primary care to Identify patients who have diabetes or at risk for	delays in implementing the most effective care for each person with diabetes. • Advance and support public policies to use available telemedicine services to improve patient access to primary care and to assist in self-management of diabetes. • Establish increased dental to primary care provider partnerships to refer patients at high risk to primary care providers for potential diabetes diagnosis/management. • Implement standard clinical education for all health professional trainees on all aspects of the CCM, as supported by the American Diabetes Association's Standards of Medical Care in Diabetes – 2019. • Implement mechanisms and tools in provider practices to ensure referral to self-management and lifestyle management programs. • Implement system mechanisms in provider practices to assure all patients with diabetes have an Emergency Preparedness Plan.

		diabetes and refer them to for diagnosis and treatment.	• Encourage the use of Diabetes Self-Management Education and Supports, Chronic Disease Self-Management Program, and Diabetes Self-management program among patients with diabetes and the use of telemedicine/virtual methods to improve support for self-management of diabetes as needed. • Refer patients appropriately for vision, oral, or podiatry services. • Adhere to Community Preventive Services Task Force (CPSTF) recommendations for intensive lifestyle interventions (based on Look Ahead trial/DPP model) for overweight/obese patients with type 2 diabetes to prevent complications. • Engage licensed dietician nutritionists, behavioral therapists, and exercise physiologists to participate in care teams and provide additional diabetes related training.

Table 2: Activities for Health Systems

Healthy Population	Overweight/Obesity	Prediabetes/Gestational Diabetes	Diabetes Management
• Utilize a statewide unified healthy nutrition messages to be used to promote knowledge and awareness of healthy eating. • Promote initiation of and length of breastfeeding. • Promote healthy lifestyle family planning within OB/GYN practices with women of childbearing age. • Implement healthy eating strategies as part of the population health plans and address food insecurity in partnership with community based food and meal providers, such as Area Agencies on Aging. • Collaborate with community partners to promote increased physical activity and decreased sedentary activity. • Implement strategies to increase physical activity as part of the population health plan. • Implement policies that support healthy eating in	• Encourage healthcare providers to refer overweight children and adults to appropriate evidence-based weight and lifestyle counseling. • Establish referral mechanisms in healthcare system to refer obese children and adults to obesity specialists for treatment. • Establish screening and documentation processes for annual BMI for children older than 2 years of age and adults. • Establish medical homes for screening and treatment of overweight/obesity for members of higher-risk groups. • Establish universal Social Determinants of Health screening tools and promote providers use of z-codes in primary care and pediatrician practices for overweight/obese patients (food insecurity, poverty, housing instability,	• Identify risk, test at-risk people, diagnose (using ICD-10 codes) prediabetes, and implement practice mechanisms to assure referral of patients to interventions. • Develop and train providers to utilize an e-referral application within CRISP to facilitate referrals to the BeHealthyMaryland.org referral page and National DPP Lifestyle Change Programs. • Engage healthcare and WIC providers to implement mechanisms and tools within provider practices to test for diabetes at 4-12 weeks postpartum for women with history of gestational diabetes. • Build knowledge and ability of providers to adhere to clinical guidelines for women with history of gestational diabetes for regular testing, healthy lifestyle support and	• Enable CRISP to collect and aggregate electronic health record data from participating clinical partners to facilitate population health decision making action for diabetes. • Encourage use of a framework, such as the CCM for adherence to clinical guidelines and increase use of EHR best practice advisories, dashboards, and provider referencing of guidelines to achieve better compliance with routine care items such as A1C, eye/foot exams, dental health, urine proteinuria/nephropathy screening. • Following the delivery system design principles of frameworks such as the CCM, engage clinical team members to improve efficiency in quality care delivery by (i.e. dentists, optometrists/ophthalmologists, podiatrists, pharmacists, nurses, medical assistants, social workers, case managers, lab technicians), to achieve more intensive disease

health system facilities (cafeterias, vending machines). • Engage academia for medical schools to include nutrition education and obesity pathophysiology and prevention/treatment into curriculum to maintain accreditation by professional associations. • Establish community investment to support healthy lifestyles in communities.	neighborhood safety, and provide social and case management support). • Establish use of mobile and telehealth technology by case managers, registered dieticians, and healthcare providers to monitor high risk patients to help them achieve weight management goals. • Establish nutrition counseling services via primary care and community-based providers and increase those billing for nutrition counseling.	potential use of medication to reduce risk. • Implement coordinated strategies to encourage women with a history of gestational diabetes to breastfeed. • Develop and train providers to utilize the CRISP e-referral to refer women with gestational diabetes history to evidence-based lifestyle change programs or interventions. • Increase number of people at risk for prediabetes who are tested, referred and complete and reach evidence-based lifestyle change program target goals.	management and decrease delays in implementing the most effective care for each person with diabetes. • Use available telemedicine services to improve patient access to primary care and to assist in self-management of diabetes. • Establish increased dental-to-primary care provider partnerships to refer patients at high risk to primary care providers for potential diabetes diagnosis/management. • Implement mechanisms and tools in provider practices to ensure referral to self-management and lifestyle management programs. • Implement system mechanisms in provider practices to assure all patients with diabetes have an Emergency Preparedness plan. • Support CRISP and the Maryland Institute for Emergency Medical Services Systems (MIEMSS) in efforts to identify and track diabetes-related patient encounters that do not result in emergency department visits or hospital admissions.

Table 3: Activities for Community groups (Faith-based and community organizations, and local government)

Healthy Population	Overweight/Obesity	Prediabetes/Gestational Diabetes	Diabetes Management
• Utilize a statewide unified healthy nutrition messages to be used to promote knowledge and awareness of healthy eating. • Expand implementation of healthy cooking and healthy eating education and skill-building offered by evidence-based programs. • Promote initiation of and length of breastfeeding. • Develop and sustain a unified statewide summer feeding program (breakfast and lunch through summer months) in underserved communities. • Increase access to farmers markets and the number of farmers and urban farms participating in markets. • Encourage community collaboration to implement formal walking plans. • Expand the number of physical activity and healthy eating offerings at parks and recreation centers, places of worship, community and	• Support counties in assessment of county food environment by mapping healthy food priority areas to elucidate relationship between food insecurity/inadequate healthy food access and obesity in each county (Ex. https://planning.baltimorecity.gov/baltimore-food-policy-initiative/food-environment) • Establish and promote physical activity opportunities specifically for overweight/obese children and adults outside work and school. • Expand the implementation of healthy cooking, teaching kitchens and healthy eating education and skill-building opportunities amongst overweight/obese adults and children.	• Engage partners to build evidence for diabetes prevention outcomes on new and existing weight management and loss programs. • Address barriers to participation in lifestyle programs (i.e. transportation, childcare, healthy food, exercise programs).	• Explore opportunities by which certified Community Health Workers can specialize in and join care teams to provide a range of diabetes-related community work, including prevention, referral and patient support. • Advocate for payment models that support diabetes education and care delivery. • Collaborate with health care providers and health systems to make linkages to home meal services for people with diabetes. • Use available telemedicine services to improve patient access to primary care and to assist in self-management of diabetes.

civic centers, and senior centers.			
• Sponsor weight loss competitions by partnering with community groups, and faith-based groups.			
• Promote the replacement of screen time with increased physical activity alternatives.			
• Promote opportunities to use shared community green spaces for physical activity.			
• Assess the feasibility of subsidizing gym memberships through public-private partnerships.			
• Access the feasibility of increasing the use of wearables (fitness trackers) to increase physical activity.			
• Establish community investment to support healthy lifestyles in communities.			
• Embrace shared use agreements to improve health and equity (i.e. churches opening their center for free exercise classes to the community).			
• Establish physical activity opportunities specifically for			

overweight/obese children and adults outside of work and school. • Advocate for and promote legislation that institutes incentives for grocery stores to provide affordable, healthy food options in underserved communities. • Implement policies that support healthy eating in institutions (vending machines, prayer breakfasts, etc.) • Increase access to farmers markets and the number of farmers and urban farms participating in markets. • Advocate for and promote legislation that institutes incentives for grocery stores to provide affordable, healthy food options in underserved communities. • Promote policies that improve the built environment to link people to everyday destinations such as work, school, parks and green spaces. • Sponsor weight loss competitions. • Promote the replacement of screen time with increased			

physical activity alternatives.			
• Engage partners to build evidence for diabetes prevention outcomes on new and existing weight management and loss programs.			
• Address barriers to participation in lifestyle programs (i.e. transportation, childcare, healthy food, exercise programs).			

Table 4: Activities for Schools

Healthy Population	Overweight/Obesity	Prediabetes/Gestational Diabetes	Diabetes Management
• Utilize a statewide unified healthy nutrition messages to be used to promote knowledge and awareness of healthy eating. • Support wellness policies and teams that improve healthy eating in institutions such as school cafeterias. • Assess the feasibility of implementing digital platforms to improve school nutrition programs (i.e. allowing parents and students to electronically preorder nutritious school meals). • Expand implementation of healthy cooking and healthy eating education and skill-building offered by evidence-based programs in schools for parents and children. • Develop and sustain a unified statewide summer feeding program (breakfast and lunch through summer months) in underserved communities. • Implement frameworks, such as Whole School, Whole	• Engage MSDE and others to seek opportunities for education about and implementation of increased physical activity as a required element of a school day. • Provide technical assistance and program development to local education agencies wishing to implement school based BMI screening and/or surveillance processes.	• Explore feasibility of incorporating specific questions related to prediabetes into the school physical form and increasing the frequency with which the forms must be provided to schools to align with immunization (IZ) requirements. • Engage school-based centers to refer children at risk of diabetes to providers and community-based risk-reduction services. • Identify opportunities to utilize Medicaid and MCO data to identify and track children at risk for diabetes and/or with prediabetes served in school-based health clinic. • Work with MSDE to expand School-based health clinic data collection related to diabetes risk and prediabetes screening and reporting.	• Advance and support public policies to facilitate expansion of tele-health in schools to improve access to care and support school nurses to foster self-management of diabetes among students with diabetes. • Identify opportunities for schools to address the unique needs of students with type 2 diabetes that focused on healthy eating and physical activity.

Community, Whole Child to increase opportunities for healthy food and physical activity opportunities throughout the school day and after school. • Promote the replacement of non-curricular screen time with increased physical activity alternatives. • Promote policies that improve the build environment to link people to everyday destinations such as work, school, parks and green spaces.			

Table 5: Activities for Employers

Healthy Population	Overweight/Obesity	Prediabetes/Gestational Diabetes	Diabetes Management
• Utilize a statewide unified healthy nutrition messages to be used to promote knowledge and awareness of healthy eating. • Establish breastfeeding policies for worksites. • Collaborate with farmers markets at worksites. • Encourage multiple modes of transportation and commuting. • Implement policies that support physical activity and healthy eating in worksites. • Assess the feasibility of subsidizing gym memberships through public-private partnerships. • Assess the feasibility of increasing the use of wearables (fitness trackers) to increase physical activity. • Promote stair climbing and walking during breaks. • Offer weight management programs as a covered benefit and offer classes at work.	• Offer diabetes prevention programs as a covered benefit. • Partner with a diabetes prevention program to offer classes at work sites. • Partner with weight loss programs. • Provide incentives for milestone and/or completing weight loss programs. • Provide third party reimbursement for nutrition counseling for overweight/obese employees and their covered family members.	• Establish the National DPP as a benefit option for employees. • Connect with the Maryland Quitline for tobacco cessation for employees. • Offer diabetes prevention programs as a covered benefit. • Partner with a diabetes prevention program to offer classes at worksites.	• Support persons with diabetes in the workplace through coverage of self-management services and wellness programs, and encouragement to remain engaged with primary care providers. • Partner with local public health to offer recognized DSMES at work. • Cover insulin pumps and insulin as a copay and ensure benefits package allows for similar co-pays on insulin pens and syringes. • Offer refrigerators at work for insulin storage. • Offset the cost of medications and premium reductions for persons who maintain an A1C under seven. • Engage community partners to provide diabetes education to employees.

• Sponsor weight loss competitions. • Expand implementation of healthy cooking and healthy eating education and skill-building offered by evidence-based programs. • Promote policies that improve the build environment to link people to everyday destinations such as work, school, parks and green spaces. • Establish community investment to support healthy lifestyles in communities.			

Table 6: Activities for Health Insurance Payors

Healthy Population	Overweight/Obesity	Prediabetes/Gestational Diabetes	Diabetes Management
• Utilize a statewide unified healthy nutrition messages to be used to promote knowledge and awareness of healthy eating. • Improve current benefit structures to encourage prevention and health living, such as value-add benefits to insurance plans and employee benefits to encourage healthy behavior change activities and participation in prevention programs.	• Explore expanded public and private insurance coverage for clinically supervised weight loss for obese children and adults without secondary co-morbidities. • Establish reimbursement models for nutrition counseling for overweight/obese children and adults.	• Establish the National DPP as a benefit option for employers using a pay-for-performance model.	• Engage partners across the state to support payment mechanisms, that support high quality, state of the art diabetes care and prevention including the use of telemedicine, case managers, and community health workers, and implement payment incentives to encourage the use of DSMES, CDSMP, and DSMP among people with diabetes.

Table 7: Activities for State Government

Healthy Population	Overweight/Obesity	Prediabetes/Gestational Diabetes	Diabetes Management
• Utilize a statewide unified healthy nutrition messages to be used to promote knowledge and awareness of healthy eating. • Implement policies that support healthy eating in institutions, such as worksites, health systems, senior centers and school cafeterias. • Assess the food supply chain for opportunities to address healthy food pricing, cost of fresh fruits and vegetables and access to healthy foods. • Assess and forecast access to fresh fruits and vegetables by geography. • Advocate for and promote legislation that institutes incentives for grocery stores to provide affordable, healthy food options in underserved communities. • Implement statewide policies that increase opportunities for students to be physically	• Establish a reliable population-level data source for child body mass index. • Engage MSDE and others to seek greatly increased opportunities for physical activity as a required element of a student's life. • Identify prevalence of school districts in the state with a minimum time requirement for physical education. • Assess the percentage of third-party payers covering comprehensive obesity management services for adults and children. • Align quality metrics across health care programs in Maryland to require at-risk screening (e.g. MDPCP has proposed to CMS to add weight assessment and counseling as a P4P measure in 2020). • Complete return on investment (ROI) for	• Increase capacity of evidence-based lifestyle change programs, such as the CDC-recognized lifestyle change program, in the state to deliver and bill payers and insurers for lifestyle change programs. • Implement a communication campaign on prediabetes to increase screening and testing, with targeted messages to enroll and retain HealthChoice DPP and Medicare enrollees. • Build knowledge and ability of healthcare providers to identify risk, test at-risk people, diagnose prediabetes, and implement practice mechanisms to assure referral of patients to interventions. • Align quality metrics across health care programs in Maryland to require at-risk screening (e.g., MDPCP has proposed to CMS to add	• Develop and encourage use of standardized social determinants of health screening tools for use statewide for all patients with diabetes. • Convene and sustain a statewide diabetes clinical collaborative committee to develop universal quality measures for diabetes. • Encourage the use of Diabetes Self-Management Education and Supports, Chronic Disease Self-Management Program, and Diabetes Self-management program among patients with diabetes and the use of telemedicine/virtual methods to improve support for self-management of diabetes as needed. • Explore opportunities for certified Community Health Workers to specialize in and join care teams to provide a range of diabetes-related community work, including

active throughout the school day and after school.
- Promote policies that improve the build environment to link people to everyday destinations such as work, school, parks and green spaces.
- Incentivize employers to encourage multiple modes of transportation and commuting.
- Implement the Maryland (MDOT) Pedestrian and Bicycle Plan.
- Increase access to farmers markets and the number of farmers and urban farms participating in markets.
- Promote initiation of and length of breastfeeding.
- Establish community investment to support healthy lifestyles in communities.

Maryland diabetes prevention efforts to track progress.
- Maintain and foster a statewide network to increase the number of evidence-based lifestyle change programs, including group, virtual and blended programs.
- Increase existing CDC-Recognized Organization's capacity to bill for new coverage (i.e. Medicaid and Medicare) and business acumen.
- Establish insurance regulations and engage elected officials to introduce new legislation related to preventing and treating prediabetes.
- Establish data source for women with gestational diabetes and postpartum testing.
- Support counties in assessment of county food environment by mapping healthy food priority areas to elucidate relationship between food insecurity/inadequate healthy food access and

weight assessment and counseling as a pay-for-performance measure in 2020)
- Complete return on investment (ROI) for Maryland diabetes prevention efforts to track progress.
- Maintain and foster a statewide network to increase the number of evidence-based lifestyle change programs, including group, virtual and blended programs.
- Increase existing CDC-Recognized Organization's capacity to bill for new coverage (i.e. Medicaid and Medicare) and business acumen.
- Establish insurance regulations and engage elected officials to introduce new legislation related to preventing and treating prediabetes.
- Establish a data source for women with gestational diabetes and postpartum testing.
- Engage healthcare and WIC providers to implement

prevention, referral and patient support.
- Establish a diabetes platform to collect and track data on aggregated patient care outcomes, coordinate care across specialties, identify gaps in care and assure quality care.
- Enable CRISP to collect and aggregate electronic health record data from participating clinical partners to facilitate population health decision-making actions for diabetes.
- Develop a health literacy program to increase awareness of the importance of oral health for adults at risk for and with diagnosed diabetes and the connection between diabetes and oral health.
- Develop a set of guidelines for primary care and oral healthcare providers that includes state-specific guidance on oral health care for adults at risk for and with diagnosed diabetes, including statistics on oral healthcare utilization, clinical practice guidance, and educational resources.
- Investigate barriers to payment models that support diabetes treatment and education.

	obesity in each county (Ex. https://planning.baltimorecity.gov/baltimore-food-policy-initiative/food-environment). • Explore expanded public and private insurance coverage for clinically supervised weight loss for obese children and adults without secondary co-morbidities.	mechanisms and tools within provider practices to test for diabetes at 4-12 weeks postpartum for women with history of gestational diabetes. • Build knowledge and ability of providers to adhere to clinical guidelines for women with a history of gestational diabetes for regular testing, healthy lifestyle support and potential use of medication to reduce risk. • Establish a diabetes education, screening, and referral program in dental practices throughout Maryland. • Establish a data source to track adult dental patients screened for diabetes or prediabetes during routine dental visits. • Engage partners, such academia, to build evidence for diabetes prevention outcomes on new and existing weight management and loss programs.	• Explore reimbursement of DSMES for Medicaid enrollees. • Encourage use of a framework, such as the CCM for adherence to clinical guidelines and increase use of EHR best practice advisories, dashboards, and provider referencing of guidelines to achieve better compliance with routine care items such as A1C, eye/foot exams, dental health, urine proteinuria/nephropathy screening.

V.   Inventory of Diabetes-related Resources/Appendices

Development of a Diabetes Program Inventory

In June 2019, the Maryland Department of Health (the Department) initiated a process to inventory obesity, prediabetes, and diabetes programs in Maryland. The aim of the inventory is to assess the availability of programs across Maryland that address diabetes prevention, care, and management. While the required level of service provision across the state cannot be determined through the inventory alone, the Department aims to use this process to begin to identify gaps and opportunities to expand efforts to address diabetes.

The scope of the inventory is all programs serving Marylanders, including those that serve Medicaid enrollees, Medicare beneficiaries, commercial and small business health insurance enrollees, and the uninsured population. The inventory includes programs that serve specific minority groups. The programs are categorized according to where the target population is situated along the disease progression continuum: 1) Keeping a Healthy Weight Population; 2) Reducing Overweight and Obese Populations; 3) Prediabetes and Gestational Diabetes Populations; 4) Managing Diabetes and Controlling Complications. The normal clinical management of diabetes patients within a primary care or hospital setting was excluded from the scope.

The Department conducted a review of a wide range of available resources, initially including: Community Health Needs Assessments (CHNAs); Local Health Improvement Plans (LHIPs); Hospital Community Benefit Reports; Maryland Hospital Association's (MHA) "Innovations for Better Health" website; the Centers for Disease Control and Prevention's (CDC) national registry of all recognized diabetes prevention programs; Maryland Community Health Resources Commission (CHRC) grantees; Minority Outreach and Technical Assistance (MOTA) grantees; the American Diabetes Association website; the American Association of Diabetes Educators website; the Supplemental Nutrition Assistance Program Education (SNAP-Ed) program; the Expanded Food and Nutrition Education Program (EFNEP); the Curves program; the Take Off Pounds Sensibly program (TOPS Club); and the WW (formally Weight Watchers) program.

The Department sought input from Local Health Departments (LHDs), Local Health Improvement Coalitions (LHICs), and minority outreach groups in the development of the inventory. The Department presented its plans for a Diabetes Program Inventory at the July 2019 Local Health Officers (LHO) Roundtable and incorporated the feedback received at this meeting into its approach. Jurisdiction-specific reports of programs were shared in advance of publication with Local Health Officers; LHIC leaders, where these are different; and MOTA partners. Information on additional programs received because of this outreach is included in the draft inventory. Through the publication of the Maryland State Diabetes Action Plan, the Department is now seeking input from a wider range of stakeholders.

The inventory will continue to be refined and updated and can be accessed at
https://phpa.health.maryland.gov/CCDPC/Pages/diabetes-action-plan.aspx. As a next step, the
Department aims to gather more details on the reach and capacity of diabetes programs. Along
with available data on obesity and diabetes, the Department will use a final inventory to
generate a detailed assessment of gaps in service provision and promote action to address
these gaps. Emphasis will be placed on identifying data sources, including from the school
system, and developmentally appropriate interventions for children.

Diabetes Prevention and Care

While diabetes care services have long been part of Maryland Medicaid's comprehensive benefits package (COMAR 10.9.67),[126] diabetes prevention services were recently approved by Centers for Medicare and Medicaid (CMS) and added as part of the HealthChoice benefit package.

HealthChoice Diabetes Prevention Program (HealthChoice DPP)

Maryland Medicaid has been a leader in integrating diabetes prevention into its HealthChoice program through its MCOs. In 2016, through a cooperative agreement with CDC, the National Association of Chronic Disease Directors (NACDD) awarded funding to Maryland Medicaid in collaboration with the Center for Chronic Disease Control and Prevention (the Center) to implement the Maryland Medicaid and National DPP demonstration. The purpose of the demonstration was to promote Medicaid delivery models for the National DPP through Managed Care Organizations. Maryland enrolled 637 HealthChoice enrollees into the National DPP lifestyle change program during the demonstration period. As a result of this demonstration, the Department applied for and received a §1115 HealthChoice demonstration waiver amendment that authorizes Medicaid to offer the National DPP lifestyle change program to HealthChoice enrollees beginning September 1, 2019. By identifying beneficiaries early through screening and testing for prediabetes and referring them to the National Diabetes Lifestyle Change Program, the Department hopes to reduce the incidence of diabetes and increase the quality of life for individuals at-risk for Type 2 diabetes in the HealthChoice program.

Investing in Prevention Programs

From 2016-2018, Maryland Medicaid, in collaboration with Maryland State Health Department's Center for Chronic Disease Prevention and Control, was funded to implement the National DPP Medicaid Demonstration project in Maryland. The National DPP Lifestyle Change Program is an evidence-based program established by CDC to prevent or delay the onset of type 2 diabetes through healthy eating and physical activity. Diabetes prevention programs that are recognized by the CDC, known as CDC-recognized type 2 diabetes prevention programs, participated with MCOs to establish a reimbursement mechanism within Medicaid to administer the program. Adults with prediabetes between the ages of 18 and 64 were eligible to participate.

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[126] 10.09.67 Maryland Medicaid Managed Care Program: Benefits Authority: Health-General Article, Title 15, Subtitle 1, Annotated Code of Maryland, .24 Benefits — Diabetes Prevention and Care Services (2019).

Acronyms

A1C	Glycosylated Hemoglobin
ADA	American Diabetes Association
BRFSS	Behavioral Risk Factor Surveillance System
BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
CDSMP	Chronic Disease Self-Management Plan
CHNA	Community Health Needs Assessment
CHRC	Community Health Resource Commission
CMS	Centers for Medicare and Medicaid Services
CPSTF	Community Preventive Services Task Force
CY	Calendar Year
DPP	Diabetes Prevention Program
DSMES	Diabetes Self-Management Education and Support
DSMP	Diabetes Self-Management Plan
EBT	Electronic Benefit Transfer
ED	Emergency Department
EFNEP	Expanded Food and Nutrition Education Program
FPG	Fasting Plasma Glucose
HiAP	Health in All Policies
ICD	International Classification of Diseases
LHD	Local Health Department
LHIC	Local Health Improvement Coalition
LHIP	Local Health Improvement Plan
LHO	Local Health Officer
MCO	Managed Care Organization
MDOT	Maryland Department of Transportation
MDPCP	Maryland Primary Care Program
MHA	Maryland Hospital Association
MOTA	Minority Outreach and Technical Assistance
NACDD	National Association of Chronic Disease Directors
NH	Non-Hispanic
OGTT	Oral Glucose Tolerance Test
P4P	Pay for Performance
PMPM	Per-Member-Per-Month
PQI	Prevention Quality Indicator
SDOH	Social Determinants of Health
SNAP	Supplemental Nutrition Assistance Program
TOPS	Taking off Pounds Sensibly
WW	Weight Watchers
YRBS	Youth Risk Behavior Survey

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