

User Manual for the Diabetes Prevention Impact Toolkit

September 2025

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1. INTRODUCTION

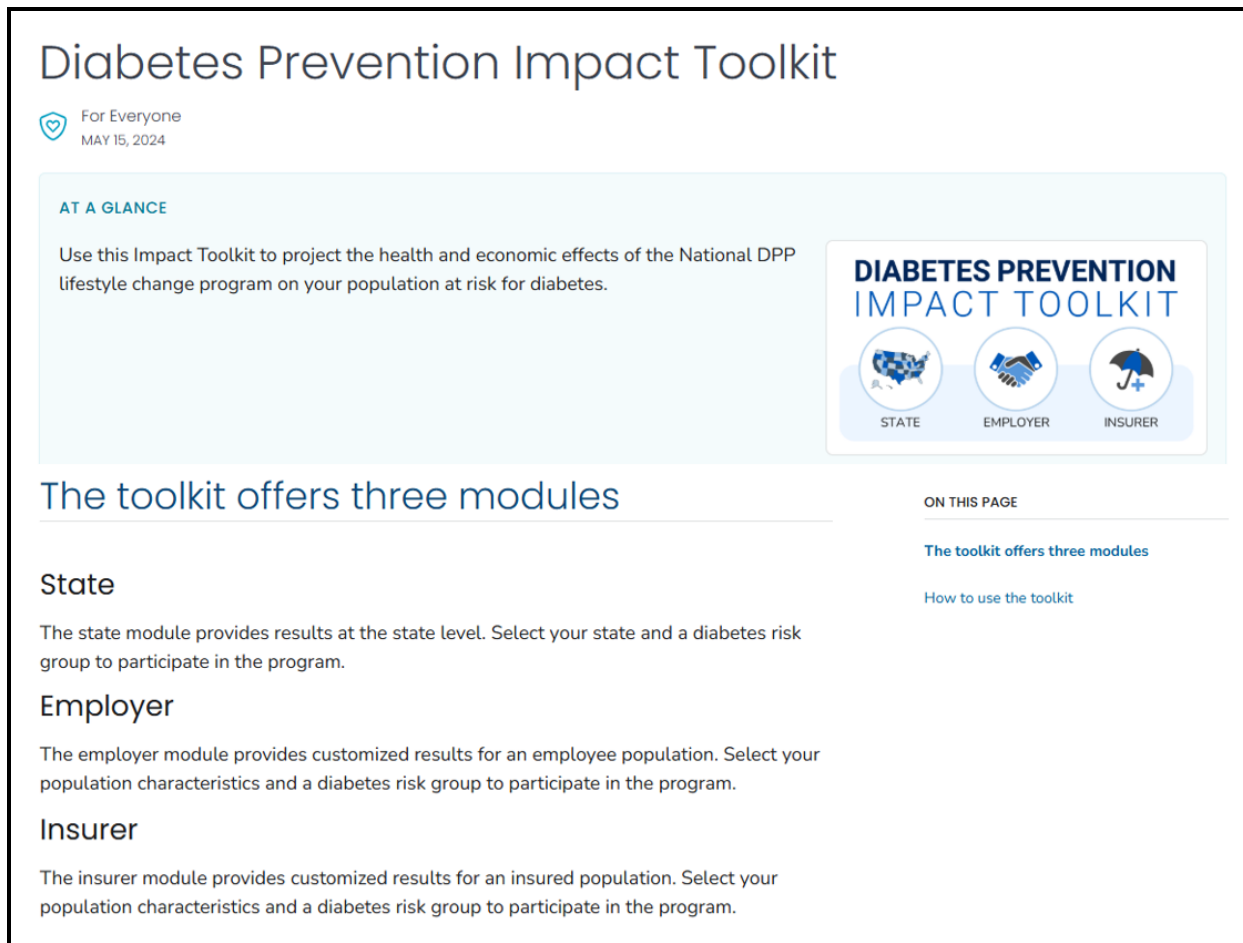
The Diabetes Prevention Impact Toolkit, Version 1.0, was developed by RTI International for the Centers for Disease Control and Prevention (CDC). The modernized version, Version 2.0, was developed by Peraton.

The purpose of the Impact Toolkit is to project the health and economic effects of the National Diabetes Prevention Program (National DPP) lifestyle change program or similar programs on populations at risk for diabetes for states, employers, or insurers.

The Impact Toolkit website provides three modules (Figure 1):

- State: Provides results at the state level.
- Employer: Allows users to generate customized results for their employee population.
- Insurer: Allows users to generate customized results for their insured population.

Figure 1. Diabetes Prevention Impact Toolkit Website



2. INPUT DASHBOARD

The modules are very similar, with the main difference in the Population Characteristics section of the Input Dashboard. Specifically, in the Employer and Insurer modules, users can choose from a set of predefined populations or enter a customized set of population characteristics. In the State module, users are only offered state populations. Sections 2.1 through 2.3 of this User Manual describe the Population Characteristics inputs for each module separately. All other sections apply to all three modules, except for Section 2.5.7 Productivity Costs, which only applies to the Employer module.

For each module (State, Employer, and Insurer), the Population Characteristics section has different features and functions. Section 2.1 covers the technical details of population characteristics for the State module, Section 2.2 covers the Employer module, and Section 2.3 covers the Insurer module. Sections 2.4 and 2.5 cover the technical details associated with additional sections of the Input Dashboard that are the same in each module (e.g., screening assumptions, cost assumptions).

When you first open the Input Dashboard (Figure 1), you will see a limited set of inputs. To obtain baseline results quickly, make selections from this limited set of inputs and then click **Get Results**. If you do not change any of these inputs, results will be generated based on default values for the population. In the State module, you must select a state before clicking **Get Results**.

- To view the full set of inputs and selections, click **Customize Further**. All inputs are set to a default value that reflects the average costs, effects, screening history, and participation rates of the U.S.-based National DPP lifestyle change program or similar programs. However, your state or organization's inputs and selections may differ from the average.
 - To learn more about how to customize inputs, continue reading Section 2 (Input Dashboard).
 - To learn more about interpreting the toolkit results, see Section 3 (Output Dashboard).
 - For a checklist of all data items and selection decisions that you can customize, refer to the Data Input Checklists provided for each module on the Impact Toolkit's HELP page.
 - To learn more about an input field in real time, hover over the blue circles with an "i" in the center (). These tooltips display a few key points related to the adjacent text or input field.

2.1 State Module Population Characteristics

When a state is selected from the dropdown list (Figure 2) or from the U.S. map:

- The Impact Toolkit references a table of state-level population data.
- The number of adults in your state (or at the national level) will automatically populate next to the heading *Number of Adults*. Another table stored in the State module contains the state-specific predicted prevalence for each of the risk groups eligible to participate in the National DPP lifestyle change program or similar programs.
- The default risk group is set to *Persons with prediabetes*, but you can also select a larger group (*Persons with prediabetes and other persons at risk for type 2 diabetes*) or a smaller group (*Persons with high-risk prediabetes*). These risk groups only include persons who are eligible for the National DPP lifestyle change program (and who have a body mass index [BMI] ≥ 24 kg/m²). See Section 2.4 for more information on how these groups are defined.

National estimates in the State module (*UNITED STATES* selection in the dropdown menu) do not use a prediction equation to predict the prevalence of *Persons with prediabetes* because their prediabetes status is observed in the results of the National Health and Nutrition Examination Survey (NHANES) laboratory data (i.e., A1C or fasting plasma glucose [FPG] test results). As a result, we used NHANES data (2011–2014) directly for the U.S. population selection in the State module, whereas state-level data were based on (1) the prediabetes prediction equation estimated in NHANES (2011–2014) and (2) the state-level characteristics observed in the Behavioral Risk Factor Surveillance System (BRFSS) (2014).

Depending on your screening and participation assumptions (see Sections 2.5.1 and 2.5.2), only a fraction of eligible state residents will end up participating in the National DPP lifestyle change program or similar programs and reducing their risk of progression to diabetes.

Figure 2. State Input Dashboard

The screenshot shows the 'State Input Dashboard' interface. At the top, there are three tabs: 'State' (selected), 'Employer', and 'Insurer'. A yellow callout box points to these tabs with the text: 'The Impact Toolkit has three modules: State, Employer, and Insurer.' Below the tabs, the title 'State Input Dashboard' is followed by instructions: 'Select your state and a diabetes risk group to participate in the program. Then, (1) click "Get Results" for outcomes data based on the Impact Toolkit's default values, or (2) click "Customize Further" to enter data that are more representative of your population and program (Data Input Checklist PDF).' A 'Restore Defaults' button is on the right. A red asterisk indicates a required field. The 'Location' section has a dropdown menu labeled 'Select a state *'. The 'Number of Adults' section has a dropdown menu labeled 'Select a state to populate number of adults'. The 'Risk Group to Participate in Program' section has three radio button options: 'Persons with prediabetes' (selected), 'Persons with prediabetes and other persons at risk for type 2 diabetes', and 'Persons with high-risk prediabetes'. Below this, the 'Annual probability of diabetes' is shown as '3.8 %'. At the bottom, there are two buttons: 'Customize Further' and 'Get Results', separated by the word 'OR'.

Get started with Impact Toolkit

For technical details on the Impact Toolkit and how to use it, see the [Help](#) page for a complete list of Impact Toolkit resources.

State Employer Insurer

State Input Dashboard

Select your state and a diabetes risk group to participate in the program. Then, (1) click "Get Results" for outcomes data based on the Impact Toolkit's default values, or (2) click "Customize Further" to enter data that are more representative of your population and program ([Data Input Checklist PDF](#)).

Restore Defaults

* Required Field

Location ⓘ

Select a state *

Select a state

Number of Adults ⓘ

Select a state to populate number of adults

Risk Group to Participate in Program ⓘ

☒ Persons with prediabetes ⓘ

☐ Persons with prediabetes and other persons at risk for type 2 diabetes ⓘ

☐ Persons with high-risk prediabetes ⓘ

Annual probability of diabetes:

3.8 %

Customize Further

OR

Get Results

2.2 Employer Module Population Characteristics

The Employer module allows you to enter the number of employees in your population and select or enter the characteristics of your population. The module provides several predefined sets of population characteristics, as well as an option to enter your own

employee population characteristics (age, race/ethnicity, sex, body weight). The proportion of the population that is eligible for the National DPP lifestyle change program will be calculated using the set of population characteristics defined here and a prediction equation estimated in NHANES (2011–2014).

To select population characteristics:

1. Select the Employer tab to access the Employer module.
2. In the *Number of Employees* field, enter your population size. This number should include all employees, not just those participating in the prevention program. The default number of employees is set to 1,000 (Figure 3).
3. Select one of the following options to determine the population characteristics of your employee population:
 - a. **Assume national average for population characteristics.** A predefined set of population characteristics that uses national averages for population characteristics and prediabetes rates. National characteristics are survey-weighted estimates from the sample of U.S. persons in NHANES (2011–2014).
 - b. **Assume state average for population characteristics.** A predefined set of population characteristics that uses a particular state’s averages for population characteristics and prediabetes rates. State characteristics are survey-weighted estimates from the sample of each state’s residents in the BRFSS (2014).
 - c. **Assume industry average for population characteristics.** A predefined set of population characteristics that uses a particular industry’s averages for population characteristics. Industry characteristics are based on the sample of employed persons in NHANES (2011–2014) and the relative rates of obesity across industries. Industries are defined in NHANES using the U.S. Census Bureau’s 2002 Occupation and Industry coding system. If you do not see a choice that matches your industry, select state or national averages or enter your own employee population characteristics.
 - d. **Assume occupation average for population characteristics.** A predefined set of population characteristics that uses a particular occupation’s averages for population characteristics. Occupation characteristics are based on the sample of employed persons in NHANES (2011–2014) and the relative rates of obesity across occupations. Occupations are defined in NHANES using the U.S. Census Bureau’s 2002 Occupation and Industry coding system. If

you do not see a choice that matches your occupation, select state or national averages or enter your own employee population characteristics.

- e. **Enter employee population characteristics.** Select this option for customized results based on your organization's unique population characteristics. Refer to section 2.2.1 for more information on entering employee population characteristics.

Figure 3. Employer Input Dashboard

Get started with Impact Toolkit

For technical details on the Impact Toolkit and how to use it, see the [Help](#) page for a complete list of Impact Toolkit resources.

State

Employer

Insurer

Employer Input Dashboard

Select your population characteristics and a diabetes risk group to participate in the program. Then, (1) click "Get Results" for outcomes data based on the Impact Toolkit's default values, or (2) click "Customize Further" to enter data that are more representative of your population and program ([Data Input Checklist](#) [PDF](#)).

Restore Defaults

* Required Field

Population Characteristics

Number of employees *

- ☐ Assume **national** average for population characteristics ⓘ
- ☐ Assume **state** average for population characteristics ⓘ
- ☐ Assume **industry** average for population characteristics ⓘ
- ☐ Assume **occupation** average for population characteristics ⓘ
- ☒ **Enter employee characteristics**

AGE BREAKDOWN

18-44	54.27	%
45-64	40.22	%
65-74	5.04	%
75+	0.47	%
Total	100.00%	

SEX BREAKDOWN

Male	53.82	%
Female	46.18	%
Total	100.00%	

RACE/ETHNICITY BREAKDOWN		BODY WEIGHT BREAKDOWN	
Non-Hispanic White	66.75 %	Obese	33.90 %
Non-Hispanic Black	10.36 %	Overweight ⁱ	41.58 %
Hispanic	14.99 %	Normal Weight ⁱ	24.52 %
Non-Hispanic Asian	5.10 %		
Other Race/Ethnicity ⁱ	2.80 %		
Total		100.00%	

Risk Group to Participate in Program ⁱ

- ☒ Persons with prediabetes ⁱ
- ☐ Persons with prediabetes and other persons at risk for type 2 diabetes ⁱ
- ☐ Persons with high-risk prediabetes ⁱ

Annual probability of diabetes:

3.80 %

 Suggested Range: 1% to 7%

Customize Further

OR

Get Results

2.2.1 Entering Customized Employee Population Characteristics

For customized results based on your organization's unique population characteristics, select the *Enter employee characteristics* option. The system prepopulates the fields for each characteristic with default values that reflect national averages for the U.S. employed population. You can change these values to reflect your own employee population characteristics. Each of the population characteristics breakdowns (age, race/ethnicity, sex, and body weight) are for the overall population. For example, the various age groups in the age breakdown box are for all male and female employees combined. Different age breakdowns cannot be entered separately for males and females.

To clear all of the data that you have entered and restore the default data at any point, click the **Restore Defaults** link in the upper right-hand corner (Figure 3). The values entered in the employee characteristics fields are used to predict the percentage of employees in each risk group (see Section 2.4 for more information on risk groups).

Age Breakdown

Enter the percentage of your employee population that is in each age group. The sum of these categories must equal 100%.

Race/Ethnicity Breakdown

Enter the percentage of your employee population that is in each race/ethnicity group. The sum of these categories must equal 100%. The *Other Race/Ethnicity* group includes other non-Hispanic races and non-Hispanic multiracial persons based on NHANES 2011–2014 race/ethnicity definitions.

Sex Breakdown

Enter the percentage of your employee population that is in each sex group. The sum of these categories must equal 100%.

Body Weight Breakdown

Enter the percentage of your employee population that is in each body weight group. For the purposes of this tool, include the percentage of underweight employees in the normal weight category. To match eligibility requirements for the National DPP lifestyle change program, the BMI range for overweight is expanded beyond its clinical definition to allow for more program inclusivity. The BMI ranges corresponding to each category are as follows:

- Normal weight: $<24.0 \text{ kg/m}^2$
- Overweight: $24.0 \text{ kg/m}^2\text{--}29.9 \text{ kg/m}^2$
- Obesity: $\geq 30.0 \text{ kg/m}^2$

Note: Only employees who have overweight or obesity are eligible for participation. The sum of the three weight categories must be 100%.

2.3 Insurer Module Population Characteristics

The Insurer module allows you to enter the total number of privately insured adults in your population and select or enter the population characteristics of your population. The proportion of the population that is eligible for the National DPP lifestyle change program will be calculated using the set of population characteristics defined here and a prediction equation estimated in NHANES (2011–2014).

To select or enter population characteristics:

1. Select the Insurer tab to access the Insurer module.
2. In the *Number of Adults Insured* field, enter your population size. This number should include all privately insured adults, not just those participating in the

prevention program. The default number of privately insured adults is set to 1,000 (Figure 4).

3. Select one of the following options to determine the population characteristics of your insurer population:
 - a. **Assume national average for population characteristics.** A predefined set of population characteristics that uses national averages for population characteristics and prediabetes rates. National characteristics are survey-weighted estimates from the sample of U.S. persons in NHANES (2011–2014).
 - b. **Assume state average for population characteristics.** A predefined set of population characteristics that uses a particular state’s averages for population characteristics and prediabetes rates. State characteristics are survey-weighted estimates from the sample of each state’s residents in the BRFSS (2014).
 - c. **Assume industry average for population characteristics.** A predefined set of population characteristics that uses a particular industry’s averages for population characteristics. Industry characteristics are based on the sample of employed persons in NHANES (2011–2014) and the relative rates of obesity across industries. Industries are defined in NHANES using the U.S. Census Bureau’s 2002 Occupation and Industry coding system. If you do not see a choice that matches your industry, select state or national averages or enter your own employee population characteristics.
 - d. **Assume occupation average for population characteristics.** Select this option to use a particular occupation’s averages for population characteristics. Occupation characteristics are based on the sample of employed persons in NHANES (2011–2014) and the relative rates of obesity across occupations. Occupations are defined in NHANES using the U.S. Census Bureau’s 2002 Occupation and Industry coding system. If you do not see a choice that matches your occupation, select state or national averages or enter your own employee population characteristics.
 - e. **Enter insured population characteristics.** Select this option for customized results based on your organization’s unique population characteristics. Refer to section 2.3.1 for more information on entering employee population characteristics.

Figure 4. Insurer Input Dashboard

Get started with Impact Toolkit

For technical details on the Impact Toolkit and how to use it, see the [Help](#) page for a complete list of Impact Toolkit resources.

State

Employer

Insurer

Insurer Input Dashboard

Select your population characteristics and a diabetes risk group to participate in the program. Then, (1) click "Get Results" for outcomes data based on the Impact Toolkit's default values, or (2) click "Customize Further" to enter data that are more representative of your population and program ([Data Input Checklist](#) [PDF](#)).

Restore Defaults

* Required Field

Population Characteristics

Number of Adults Insured *

☐ Assume **national** average for population characteristics ⓘ
☐ Assume **state** average for population characteristics ⓘ
☐ Assume **industry** average for population characteristics ⓘ
☐ Assume **occupation** average for population characteristics ⓘ
☒ Enter insured adult population characteristics

AGE BREAKDOWN			SEX BREAKDOWN		
18-44	54.27	%	Male	53.82	%
45-64	40.22	%	Female	46.18	%
65-74	5.04	%	Total	100.00%	
75+	0.47	%			
Total	100.00%				

RACE/ETHNICITY BREAKDOWN			BODY WEIGHT BREAKDOWN		
Non-Hispanic White	66.75	%	Obese	33.90	%
Non-Hispanic Black	10.36	%	Overweight <i>i</i>	41.58	%
Hispanic	14.99	%	Normal Weight <i>i</i>	24.52	%
Non-Hispanic Asian	5.10	%			
Other Race/Ethnicity <i>i</i>	2.80	%			
Total			100.00%		

Risk Group to Participate in Program *i*

- ☒ Persons with prediabetes *i*
- ☐ Persons with prediabetes and other persons at risk for type 2 diabetes *i*
- ☐ Persons with high-risk prediabetes *i*

Annual probability of diabetes:

3.80 %

Suggested Range: 1% to 7%

Customize Further

OR

Get Results

2.3.1 Entering Insured Population Characteristics

For customized results based on your unique insured adult population's characteristics, select the *Enter insured adult population characteristics* option. The system prepopulates the fields for each characteristic with default values that reflect national averages for the privately insured U.S. adult population. You can change these values to reflect your own privately insured adult population characteristics.

To clear all of the data that you have entered and restore the default data at any point, click the **Restore Defaults** link in the upper right-hand corner (Figure 4). You can use the Data Input Checklist (see Section 3) as a tool to help collect all required input data. The checklist is also available through a PDF link on the Input Dashboard page.

The values entered in the insured adult population characteristics fields are used to predict the percentage of insured adults in each risk group (see Section 2.4 for more information on risk groups).

See Section **2.2.1** for the definitions of the values listed below.

- Age Breakdown
- Race/Ethnicity Breakdown
- Sex Breakdown
- Body Weight Breakdown

2.4 Risk Group to Participate in Program

After you define your population characteristics, use one of the predefined populations or your own data to select a risk group. Under the *Risk Group to Participate in Program* heading, select from the three risk groups eligible for the National DPP lifestyle change program. The annual probability of developing diabetes is different for each risk group. The default annual probability for each risk group is prepopulated in the input box. You can change this number if you want to assume a higher or lower probability of diabetes. We recommend using the default annual probabilities of diabetes unless you have (1) read Section 2.4 of the Technical Report (available on the Impact Toolkit's HELP page) and (2) generated inputs from your own data sources or identified updated data available in the scientific literature.

2.4.1 Persons With Prediabetes

This group includes persons predicted to have prediabetes (and BMI ≥ 24 kg/m²) and to have a blood sugar level that is higher than normal but not high enough for a diagnosis of diabetes (FPG 100–125 mg/dl or A1C 5.7%–6.4%). The default annual probability of diabetes for persons with prediabetes is 3.8%.

2.4.2 Persons With Prediabetes and Other Persons at Risk for Type 2 Diabetes

This group is the largest because it includes all *Persons with prediabetes* and *other persons at risk for type 2 diabetes*. This group is generally about 1.5 times larger than the risk group of persons with prediabetes. *Other persons at risk for type 2 diabetes* are defined using criteria from the CDC Prediabetes Screening Test (CDC, 2015). A score of 9 or higher on the Prediabetes Screening Test determines whether a person is at risk for diabetes. Because this group includes a broader range of persons at risk for diabetes, the default annual probability of diabetes is slightly lower, at 3.6%.

2.4.3 Persons With High-Risk Prediabetes

This group is a subset of the group with prediabetes. It is the smallest (about 34% of the prediabetes group), but it represents persons with the highest risk of progressing to diabetes. *Persons with high-risk prediabetes* are defined as persons with an A1C between 6.0% and 6.4% or an FPG between 110 and 125 mg/dl. This risk group has the highest annual probability of diabetes, with a default of 6.2%.

2.5 Additional Toolkit Inputs

After selecting your population characteristics and risk group, you can customize additional inputs by clicking the **Customize Further** button (Figure 5). We recommend starting with the *Screening* section and working your way down the page in the order in which the sections and fields are displayed. Your choice of screening options will affect subsequent input choices.

Figure 5. Accessing Additional Modifiable Inputs Using the “Customize Further” Button

Risk Group to Participate in Program ⓘ

- ☒ Persons with prediabetes ⓘ
- ☐ Persons with prediabetes and other persons at risk for type 2 diabetes ⓘ
- ☐ Persons with high-risk prediabetes ⓘ

Annual probability of diabetes:

Suggested Range: 1% to 7%

Customize Further

OR

Get Results

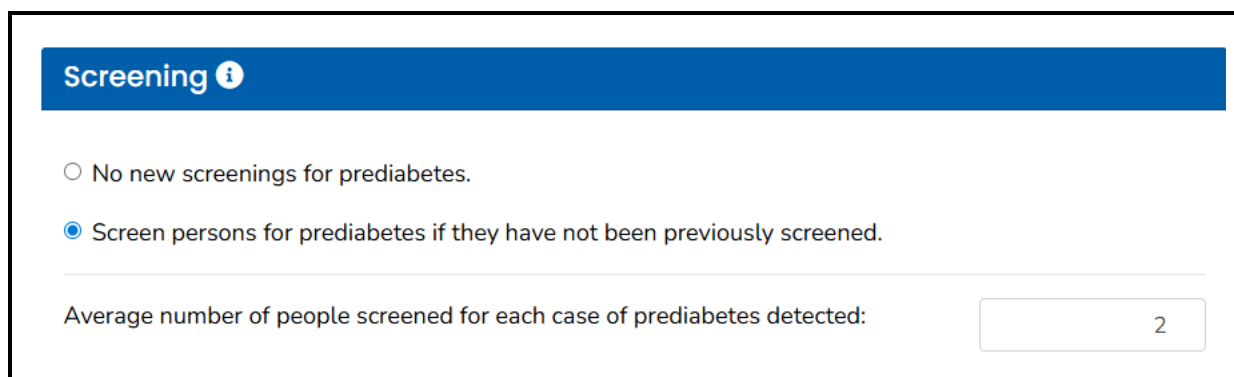
Scroll to the bottom of the *Employer* module and click **Customize Further** for additional inputs.

Although everyone in your population can be recruited and screened for the National DPP lifestyle change program, only a minority of this target population will actually be eligible and willing to participate. Sections 2.5.1 through 2.5.7 describe all assumptions related to conducting the National DPP lifestyle change program in your population. Section 3 describes how to interpret the costs and benefits realized by conducting this program, as reported in the Output Dashboard.

2.5.1 Screening

Use the *Screening* section to indicate if you want to screen potential participants for prediabetes, if they have not already been screened (Figure 6). The default setting for the toolkit assumes that 46% of your population has undergone screening recently and knows their prediabetes status (this assumption can be altered in the *Program Enrollment and Participation* section) (see Section 2.5.2). If you choose to conduct screening for unscreened persons in your population, you will incur screening costs (see Section 2.5.5).

Figure 6. Screening Inputs in the Impact Toolkit



Screening ⓘ

☐ No new screenings for prediabetes.

☒ Screen persons for prediabetes if they have not been previously screened.

Average number of people screened for each case of prediabetes detected:

If you have chosen to conduct a screening program, screening costs are shown in the screening cost calculation box in the *Program Costs* section. This box calculates the average screening cost per person as the product of the assumed screening cost (\$15 in the default setting) and the average number of persons screened per case detected (2 in the default setting). This calculation accounts for the costs of negative screenings in the overall program costs. For more information on program cost calculations, see Section 2.5.5.

To assume a different number of persons screened for the average screening cost calculation, edit the number in the box for *Average number of people screened for each case of prediabetes detected*. An increase in this number reflects an unscreened population with a low prevalence of prediabetes, whereas a decrease reflects an unscreened population with a high prevalence of diabetes.

If you are not sure about the underlying prevalence in your unscreened population, we recommend using the default setting of 2 persons screened per case detected. This number reflects a prevalence of prediabetes of about 50% among unscreened persons who agree to participate in a screening program.

2.5.2 Program Enrollment and Participation

Use this section to enter the percentage of eligible persons previously screened for prediabetes; the percentage of eligible, previously unscreened persons who are receiving

screening; and the percentage of eligible, screened persons who participate in the intervention (i.e., the National DPP lifestyle change program or similar program) (Figure 7).

Figure 7. Program Enrollment and Participation Inputs in the Impact Toolkit

Program Enrollment and Participation 	
Percentage of eligible persons previously screened for prediabetes: 	46 %
Percentage of eligible, previously unscreened persons receiving screening: 	100 %
Percentage of eligible, screened persons who participate in the intervention: 	35 %
Percentage of eligible, screened persons participating:  35.00%	

To complete program enrollment and participation:

1. Make sure you have chosen to conduct additional screening for your program and also chosen to conduct screening in the screening section.
2. In the *Percentage of eligible persons previously screened for prediabetes* field, enter the percentage of eligible participants who have already been screened for prediabetes. Persons at risk for diabetes include persons with older age, physical inactivity, family history of diabetes, high blood pressure, and other risk factors, per the American Diabetes Association (ADA, 2016) and U.S. Preventive Services Task Force (Calonge et al., 2008) criteria for screening for type 2 diabetes. Other analyses have shown that only about 11% of persons with prediabetes in 2010 were screened and aware of their disease status (CDC, 2013). The default setting is 46%, which is based on the percentage of persons at risk for diabetes who have been screened in the past 3 years (Bullard et al., 2015; Kiefer et al., 2015). You can enter this value of 11% as an alternative to the default value of 46%.
3. In the *Percentage of eligible persons previously unscreened for prediabetes* field, enter the percentage of eligible, previously unscreened persons receiving screening. The default value is 100%, which assumes that all persons with a BMI ≥ 24 who have not been screened will receive screening. You can adjust this value downward as appropriate for your population.

4. In the *Percentage of eligible, screened persons who participate in the intervention* field, enter your assumed participation rate. The default setting for the participation rate is 35%, which is based on the participation rate in a demonstration of the National DPP lifestyle change program with large employers (R. Li, R. Ackermann, personal communication, June 22, 2015). The participation rate might be higher or lower for your population based on the incentives offered for participating or the perceived benefits of participation.

The program enrollment and participation inputs are used to determine the total percentage of participation among *eligible* adults. For example, if 46% of eligible adults have previously been screened, no additional screening occurs (the default value), and the participation rate is 35%, then the total percentage of eligible adults participating will be 16% (46% X 35% = 16%). However, in a scenario where a screening program is conducted to identify additional eligible persons, the calculation is somewhat more complex (Equation 1).

Equation 1. Percentage of Eligible, Screened Persons Who Participate in the Intervention

Percentage of screened population who participate in the intervention	=	% of population previously screened for prediabetes X % of screened persons participating in intervention + [(100% – % of population previously screened for prediabetes) X % of previously unscreened persons receiving screening X % of screened persons participating in intervention]
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2.5.3 Intervention Weight Loss and Regain Schedule

In 1996, CDC supported a randomized clinical trial called the Diabetes Prevention Program (DPP). The DPP demonstrated that participants in an intensive lifestyle intervention lost about 7.2% of their weight in the first year of the program (Hamman et al., 2006; Knowler et al., 2002).

Real-world adaptations of the DPP, such as the National DPP lifestyle change program, resulted in a smaller weight loss effect—4.4% on average at the end of the first year of follow-up (R. Li, personal communication, June 24, 2015). This estimate is based on results from the National DPP lifestyle change program, represents the first year weight loss for program participants, and is supported by other studies.¹ A participant was defined as a person attending at least 4 of the 16 program sessions. Attending at least 9 sessions was associated with a slightly higher weight loss (5.1%) (R. Li, personal communication, June 24, 2015).

¹ In 2012, Ali et al. (2012) reported a 4.1% weight loss at 12-month follow-up for translational programs conducted in the United States and modeled on the DPP's lifestyle intervention.

The DPP and studies of real-world interventions with additional years of follow-up show that the initial weight lost is regained in future years. Based on data from these studies, we assume that:

- About 50% of the weight lost is regained in Year 2.
- Another 20% is regained in Year 3 (Barte et al., 2010) (Figure 8).
- All the weight lost has been regained (0% weight loss relative to baseline weight) in Years 4 through 10.

These weight loss and regain assumptions are based on the group-based National DPP lifestyle change program or similar programs with a maximum of 16 sessions over 6 months (no maintenance program after 6 months). Although these default settings are based on the best available data for the average participant in the National DPP lifestyle change program, your population and program may differ from the average. You can edit these weight loss and regain assumptions according to the expectations for your program.

Figure 8. Intervention Weight Loss and Regain Inputs in the Impact Toolkit

Intervention Weight Loss and Regain Schedule ⓘ

Enter the cumulative percentage of weight lost each year relative to baseline weight (must be less than 10%): ⓘ

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
4.4	2.4	1.9	0	0	0	0
Year 8	Year 9	Year 10				
0	0	0				

2.5.4 Program Budget

By default, the toolkit assumes that a state, employer, or insurer will offer the program to all eligible persons who want to participate. However, if your budget for implementing the National DPP lifestyle change program or similar programs is limited, do the following to set a maximum budget:

1. Select the *Set maximum budget* box. The system displays an additional entry field for you to enter your maximum budget (Figure 9).

2. Enter the budget amount. This amount will limit the number of program participants based on the size of your eligible population, your program costs, and your screening costs (if you choose to screen previously unscreened persons).

Figure 9. Program Budget Input in the Impact Toolkit

The screenshot shows a web form titled "Program Budget" with an information icon. Below the title is a checkbox labeled "Set Maximum Budget" which is checked. To the right of the checkbox is a text input field with a dollar sign icon and the number "0".

Program Budget ⓘ

☒ Set Maximum Budget

\$ 0

2.5.5 Program Costs

Use *Program Costs* to enter the per-person costs of your program. The default cost of \$499 (in 2013 U.S. dollars) is the per-participant cost of the group-based National DPP lifestyle change program or similar programs without screening costs included (Li et al., 2015). All costs in this section should be calculated and entered per participant.

If you are conducting a screening program (i.e., you selected *Screen persons for prediabetes if they have not been previously screened* in the *Screening* section), then this section will also show an *Average Screening Cost Calculation* box. Here, we assume that screening costs are \$15 in the default setting. Because either the FPG test (\$7.22) or the hemoglobin A1C test (\$17.85) can be used to diagnose prediabetes, we assume the average cost (\$15) of these two tests according to the 2015 Medicare Laboratory Fee Schedule (CMS, 2016a) (Figure 10).

If you plan to use one of these tests or believe that your screening costs differ from these estimates, you can use this section to modify the screening test costs. If you plan to use the CDC Prediabetes Screening Test (a questionnaire that can also be used to determine eligibility for the National DPP lifestyle change program) (CDC, 2015) instead of a blood test, then your costs (such as the cost of printing and distributing self-administered questionnaires) may be lower than either of the blood test costs.

We also assume that there are *Other screening costs*, which include the cost of a brief follow-up visit to discuss the patient's screening test results and refer them to a program such as the National DPP lifestyle change program. The default cost of \$24 for *Other screening costs* only includes the cost of a brief office visit and not the costs of recruitment for screening.

Other screening costs are based on the 2015 Medicare Physician Fee Schedule (CMS, 2016b) associated with an evaluation and management visit of low complexity (HCPCS Code

99211) for an established patient (about 5 minutes of face-to-face time at the cost of \$20.02 in 2015 U.S. dollars [\$24 in 2023 U.S. dollars]). This cost can be adjusted to reflect a more intensive screening program with recruitment costs. All screening costs are included in the overall program costs that are used to calculate net costs and other results in the Output Dashboard.

Figure 10. Program Cost Inputs in the Impact Toolkit

Program Cost	
Program cost per person:	\$ 499
AVERAGE SCREENING COST CALCULATION	
Screening test cost per person:	\$ 15
Other screening costs per person:	\$ 24
Number screened per case detected:	2
Average cost per case detected:	\$65.00

2.5.6 Medical Costs

In the year that a person is diagnosed with diabetes, he or she will have substantial medical costs associated with diagnosing and treating their diabetes. In each subsequent year, the person will continue to have medical costs for the treatment of the disease, although not as high as the initial year of diagnosis. These are sometimes called diabetes-attributable medical costs, and they are defined as the excess medical costs for a person with diabetes compared with a similar person without diabetes.

The default values that are provided in the toolkit reflect the average excess medical costs for persons with diabetes based on a CDC analysis of longitudinal medical claims data from MarketScan (2001–2013) (Shrestha et al., 2016). Based on these data and a review of other cost analyses, we assumed default values of \$7,690 for the first year of diagnosis and \$4,668 for the years after diagnosis (in 2013 U.S. dollars) (Figure 11). First year costs are approximately 1.65 times higher than subsequent year costs.

If you believe that excess medical costs associated with diabetes differ in your population, we suggest maintaining this approximate relationship between the first year costs and the subsequent year costs. We also suggest staying within the suggested range of \$3,300 to

\$9,900 for first year costs and \$2,000 to \$6,000 for subsequent year costs. Using excess medical cost estimates outside of these ranges may lead to results with low credibility.

Figure 11. Medical Cost Inputs in the Impact Toolkit

Annual Diabetes-attributable Medical Costs per Person ⓘ

Year of diagnosis: ⓘ Suggested Range: \$3,300-\$9,900

Years after diagnosis: Suggested Range: \$2,000-\$6,000

Discount rate: ⓘ % Suggested Range: 0%-5%

In the toolkit, all costs incurred in the future are discounted back to the present using a discount rate assumed in the *Medical Cost* section of the Input Dashboard. The discount rate input box accounts for the fact that the money we have today has more value than the money we receive in the future. It accounts for future inflation, lost investment opportunity, and risk. Applying the discount allows for a more accurate comparison of the money that will be spent in the future versus the money that is spent today. An annual discount rate of 1.0% to 5.0% is common. Our default value is 3%.

2.5.7 Productivity Costs (Employer Module Only)

In the Employer module only, we include productivity costs associated with diabetes. Productivity costs are limited to the costs of days of work missed due to diabetes and the value of these days. The value of the days of work missed (per person) is calculated as follows:

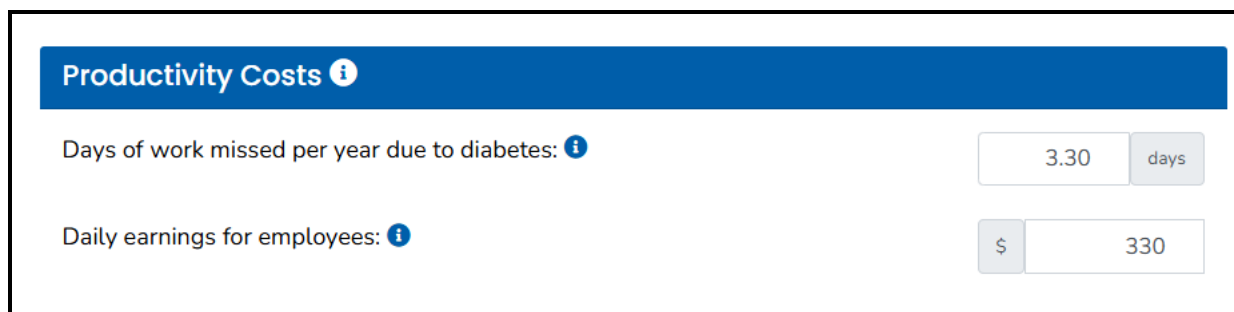
Days of work missed per year due to diabetes **multiplied by** *Daily earnings for persons with diabetes*

Days of work missed per year due to diabetes are the excess days of work missed by someone with diabetes compared to a similar person without diabetes (e.g., similar age, sex, comorbidities).

We found that, on average, a person with diabetes will miss 3.3 more days of work each year compared to a similar person without diabetes. The default daily earnings of \$330 (in

2023 U.S. dollars) was calculated based on wage data from the 2014 Current Population Survey (Figure 12). See Section 2.5.7 of the Technical Report for more information on how default estimates were obtained.

Figure 12. Productivity Cost Inputs in the Impact Toolkit (Employer Module Only)



The screenshot shows a web form titled "Productivity Costs" with an information icon. It contains two input fields. The first field is labeled "Days of work missed per year due to diabetes:" with an information icon, and it has a text input box containing "3.30" and a dropdown menu set to "days". The second field is labeled "Daily earnings for employees:" with an information icon, and it has a text input box containing "330" with a dollar sign icon to its left.

Productivity Costs ⓘ	
Days of work missed per year due to diabetes: ⓘ	3.30 days
Daily earnings for employees: ⓘ	\$ 330

After filling in all fields discussed in Sections 2.1 through 2.5, click **Get Results** to view your customized results in the Output Dashboard. See Section 3 for information about calculations made in the Output Dashboard and how to interpret results.

3. OUTPUT DASHBOARD

The results in the Output Dashboard are unique to your data inputs. They predict the health and economic outcomes for your program participants as a result of implementing the National DPP lifestyle change program or similar programs. The results include a set of seven figures and one table.

Each figure has an associated data table that can be viewed by clicking **Data Table** on the bar below each figure. Use the minus sign (-) to hide the table and the plus sign (+) to expand the table. The data tables provide all data shown in the figure and, in some cases, additional data not directly used in the figure. They include footnotes to explain some data elements as needed.

Click the **About this figure** link above each figure for information on how to read and interpret the figure. This User Manual and the Technical Report also provide further detail.

3.1 Projected Participants

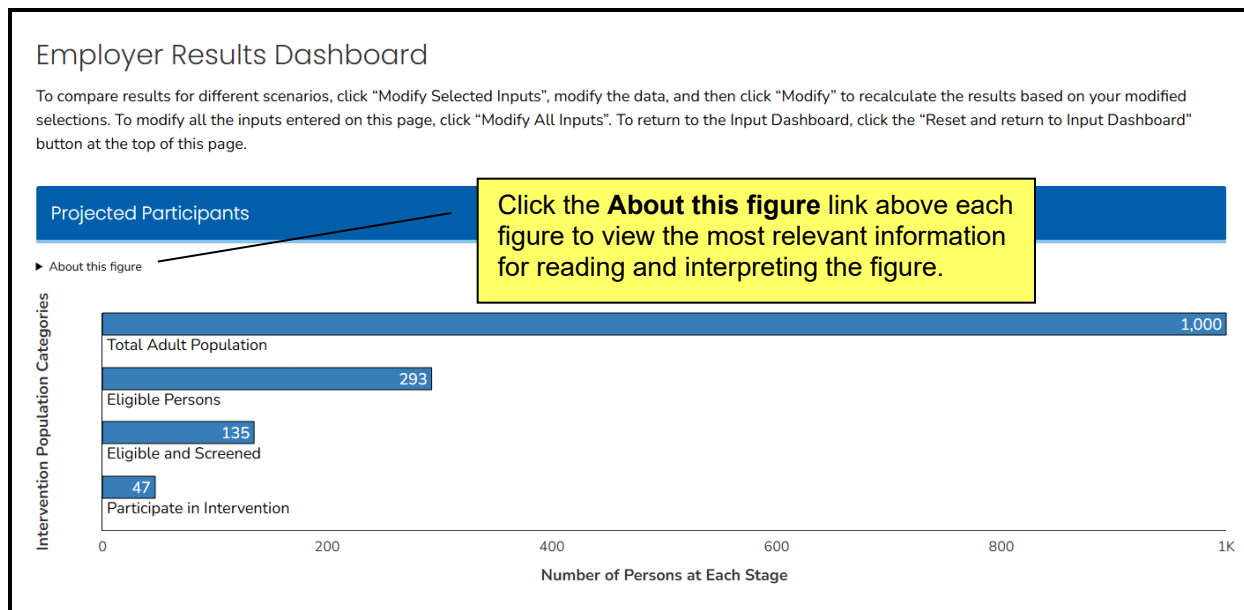
Figure 13 shows how the projected number of participants is calculated from the total population.

Total Adult Population: Indicates the total adult population being considered for the National DPP lifestyle change program. This is determined by the total adult population in your state (State module), the number of employees at your company (Employer module), or the number of insured adults (Insurer module).

Eligible Persons: A subset of the total population projected to be eligible for the intervention based on (1) the assumed population characteristics (see Sections 2.1 through 2.3) and (2) the risk group selected in the Input Dashboard (see Section 2.4).

Eligible and Screened: Some or all (depending on your screening inputs, see Sections 2.5.1 and 2.5.2) of the eligible persons that have been previously or newly screened, confirming their eligibility for the intervention. Some or all of these persons (depending on your participation inputs; see Section 2.5.2) will participate in the intervention.

Participate in Intervention: Indicates the predicted number of participants. This number is calculated by multiplying the number of *Eligible persons* in the second bar of the Figure 13 chart by the *Percentage of screened population who participate in the intervention* calculated in Equation 1 in Section 2.5.2.

Figure 13. Projected Number of Participants

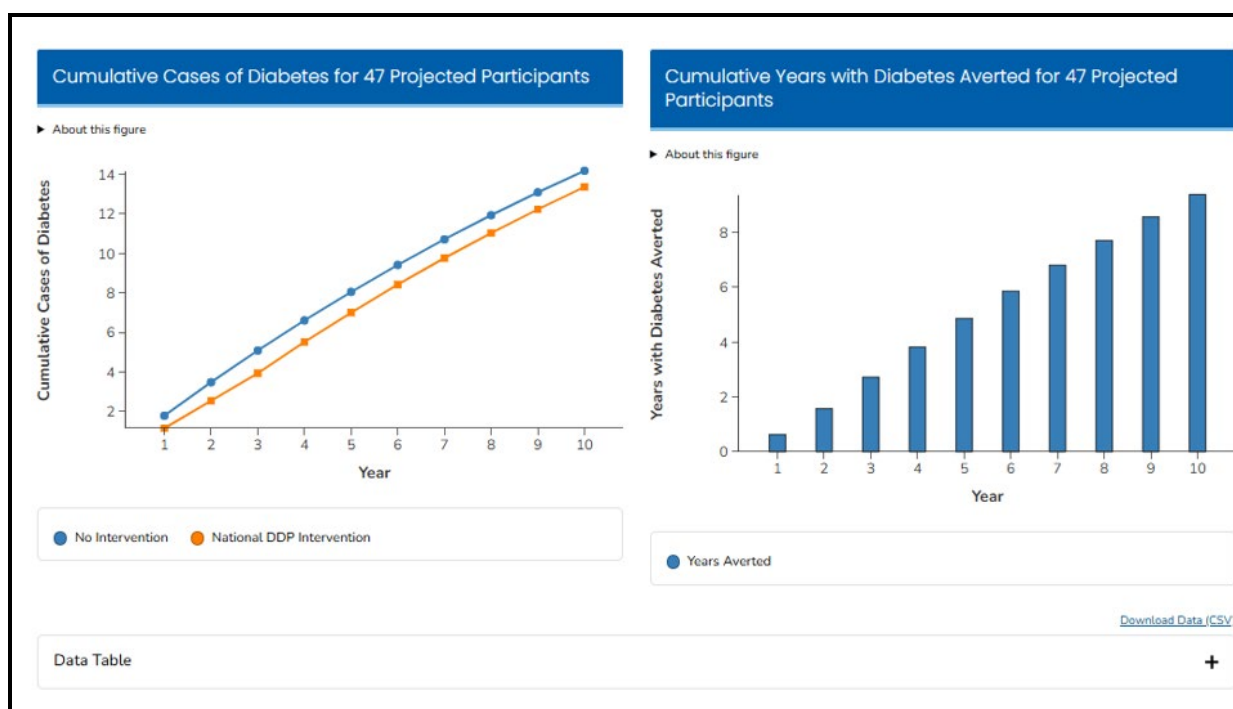
3.2 Cumulative Projected Cases of Diabetes and Cumulative Years With Diabetes Averted

Figure 14 shows the effect of the National DPP lifestyle change program or similar programs on new cases of diabetes. Specifically, it shows the cumulative number of diabetes cases with and without the National DPP lifestyle change program for your population of participants.

In the chart of the left side of Figure 14, the blue line represents the estimated number of new diabetes cases without the National DPP lifestyle change program. The orange line represents the number of new diabetes cases with the National DPP lifestyle change program. The difference between the two lines represents the cases of diabetes averted at a given point in time. The maximum number of *Cases Averted* in a single year will usually occur in the last year assumed to have some weight loss effect (Year 3 in the default setting).

In the chart on the right side of Figure 14, the cumulative years with diabetes averted is shown for your population of participants. The cumulative years with diabetes averted (by the National DPP lifestyle change program or similar programs) is the cumulative calculation of the cases averted in each year.

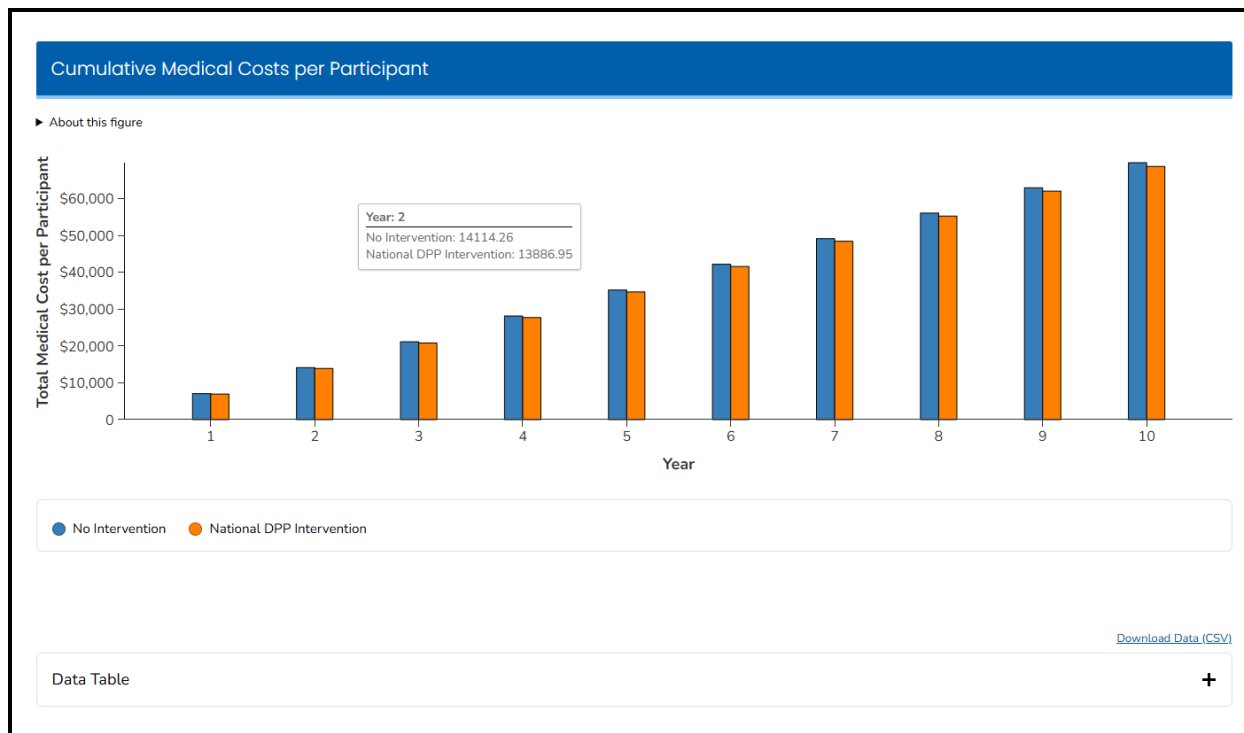
Click the **Data Table** link to see detailed data, including the number of *Cases Averted* in each year and the *Years of Diabetes Averted*. You can also hover your mouse above the lines or bars in the charts to see the associated data.

Figure 14. Cumulative Projected Cases of Diabetes

3.3 Cumulative Medical Costs per Participant

Figure 15 shows the difference in cumulative medical costs with and without the National DPP lifestyle change program (called the National DPP intervention in the figure). Results are displayed per participant and can be easily scaled up by multiplying results by your number of participants. In the figure, the blue bar on the left indicates the cumulative medical costs without the National DPP lifestyle change program, while the orange bar on the right indicates the cumulative medical costs with participation in the National DPP lifestyle change program. The cumulative medical cost savings is the difference between these two amounts. Click the **Data Table** link to see more detailed information.

Results in Figure 15 are largely affected by the medical cost assumptions (Section 2.5.6), the assumed annual probability of developing diabetes for your risk group, and the assumed weight loss effects. Even when the excess medical costs of diabetes are assumed to be large (e.g., \$7,690 in the year of diagnosis and \$4,668 in subsequent years in the default setting), the *average* difference in medical costs can be fairly small. This is because (1) only a fraction of participants develop diabetes each year (e.g., 3.8% each year in the default setting for persons with prediabetes), and (2) only a fraction of the projected cases of diabetes are averted among participants (this number will depend on the weight loss and regain assumptions).

Figure 15. Cumulative Medical Costs per Participant

3.4 Net Costs (Program Costs Minus Medical Cost Savings) per Participant

Cumulative medical costs (see Section 3.3) and cumulative program costs (see Section 2.5.2) are used to generate the cumulative net cost per participant (Figure 16). In the Employer module, productivity costs are also included.

For each year, the cumulative net cost is calculated as follows:

*Cumulative medical cost savings (and productivity cost savings in the Employer module) **minus** Cumulative program costs*

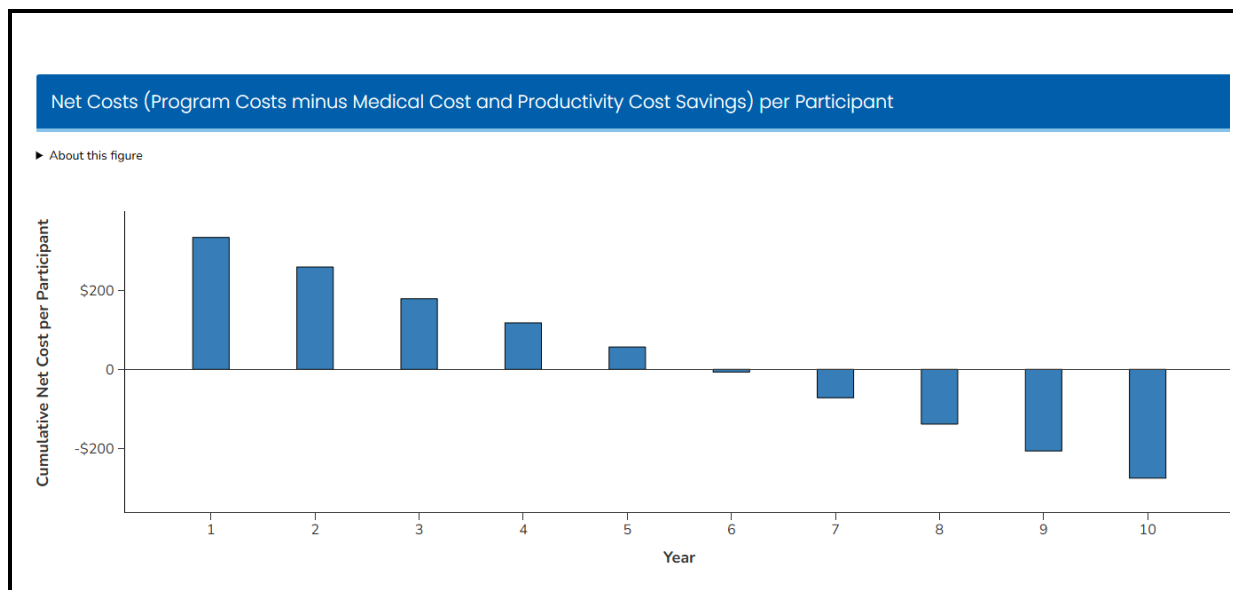
Results are displayed per participant and can be easily scaled up by multiplying results by your number of participants.

In general, the cumulative net costs decrease over time, so that by Year 10 or sooner, the cumulative net costs may be negative, indicating that the program is cost saving. Net costs fall because the program cost is only paid once, in Year 1, while medical cost savings as a result of program participation occur each year. The net cost calculation is most sensitive to your assumptions regarding the program cost, the weight loss and regain schedule, and medical costs.

Click the **Data Table** link to see more information.

Note: Net costs only include medical and program costs and do not otherwise reflect health benefits to participants.

Figure 16. Net Costs (Program Costs Minus Medical and Productivity Cost Savings) per Participant



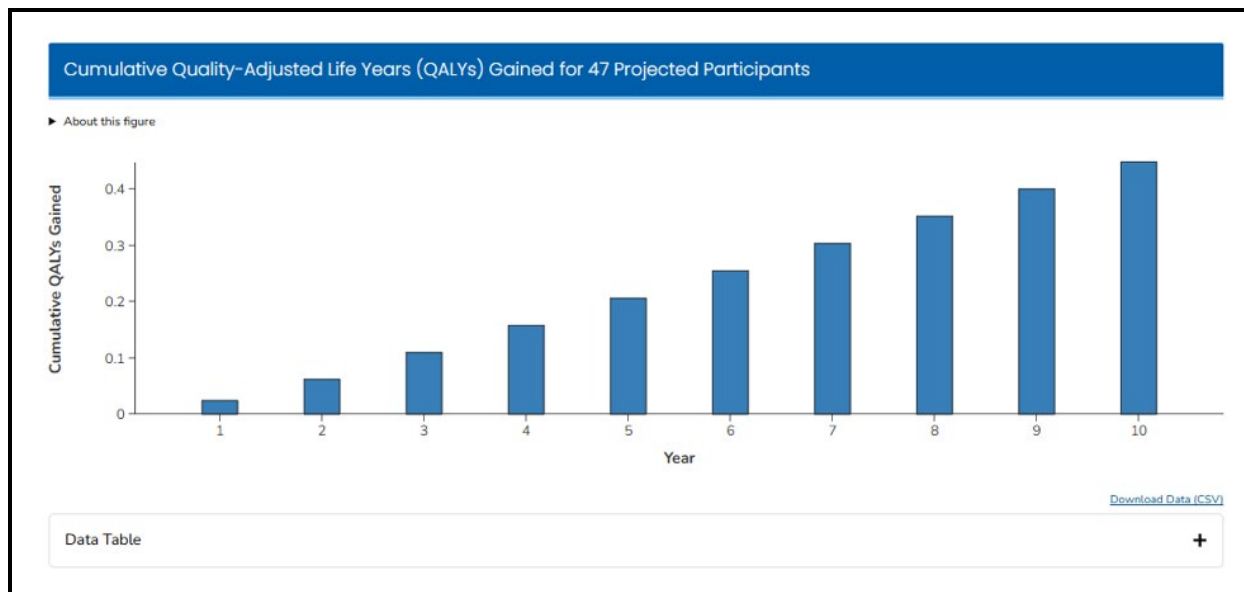
3.4.1 Productivity Costs in the Employer Module

In the Employer module, productivity cost savings are calculated in addition to medical cost savings. In Figure 16, productivity cost savings are also subtracted from the overall program costs in each period to calculate the net costs. For each new case of diabetes, a number of days of work are missed each year due to diabetes (3.3 days in the default setting; see Section 2.5.6). Each day is valued by the average wages assumed for your employee population (\$330 per day in the default setting). For example, in the default setting, about \$911 in productivity costs are incurred each year for everyone who has developed diabetes in that cycle or a previous cycle.

Click the **Data Table** link to see detailed 10-year data.

3.5 Cumulative Quality Adjusted Life Years Gained

Figure 17 shows the cumulative quality-adjusted life years (QALYs) gained for your population of participants. QALYs are a combined measure of health and time, allowing us to weight years lived by the health-related quality of life in those years. One QALY is equal to 1 year of life with a perfect quality of life.

Figure 17. Cumulative Quality Adjusted Life Years (QALYs) Gained

When a person develops diabetes, we assume that his or her quality of life is reduced by an average of about 5%. This reduction in quality of life is averted or delayed with each case of diabetes that is averted or delayed (due to the National DPP lifestyle change program or similar programs).

The cumulative QALYs gained (Figure 17) account for averting the reduction in quality of life associated with diabetes, as well as the timing of when cases are averted. For example, if weight losses are maintained throughout the whole 10-year period, then cases of diabetes will be delayed for a longer amount of time and QALY gains will be higher. If weight losses are quickly regained, then these cases of diabetes are not delayed as long and not as many QALYs will be gained.

3.6 Incremental Cost-Effectiveness Ratio (ICER)

Figure 18 shows the annual net costs per participant, QALYs gained per participant, the Incremental Cost-Effectiveness Ratio (ICER) (net costs divided by QALYs gained), and the Cost per Case Averted (cumulative cases averted or *Years of Diabetes Averted* divided by the *Net Costs*).

The ICER is a measure of the cost-effectiveness or “return on investment” associated with an intervention. It is calculated as the cumulative net costs divided by the cumulative QALYs gained. A lower ICER is better because it indicates that QALYs are gained from the intervention at a lower cost. A negative ICER indicates that the intervention is associated with QALY gains and reduced costs (i.e., a cost saving intervention). Negative ICERs are shown in Figure 18 as “Cost-saving.”

The Cost per Case Averted is found by dividing the cumulative cases averted (Figure 14) by the cumulative net cost. A negative cost per case averted means that the program is cost saving by that point in time. Negative costs per case averted are shown in Figure 18 as “Cost-saving.”

Figure 18. Incremental Cost-Effectiveness Ratio (ICER)

Incremental Cost-Effectiveness Ratios (ICERs)				
► About this figure				
Download Data (CSV)				
Year	Cumulative Net Cost ¹ (\$)	Cumulative QALYs Gained ²	Incremental Cost-effectiveness Ratio (ICER) ³ (\$/QALY)	Cost per Case Averted (\$)
1	379	0.0005	723,893	28,112
2	272	0.0013	205,208	13,603
3	157	0.0023	67,117	6,402
4	69	0.0034	20,575	2,961
5	-19	0.0044	Cost-saving	Cost-saving
6	-110	0.0054	Cost-saving	Cost-saving
7	-203	0.0065	Cost-saving	Cost-saving
8	-313	0.0075	Cost-saving	Cost-saving
9	-417	0.0085	Cost-saving	Cost-saving
10	-522	0.0095	Cost-saving	Cost-saving

Note: All costs and QALYs are discounted back to year 0. The default discount rate (3%) or user-entered rate is used to discount costs and QALYs.

1. The “Cumulative net cost” column is the cumulative difference between the discounted program costs and the medical cost-savings. Productivity cost-savings are also included if you are using the employer module.

2. The “Cumulative QALYs Gained” column represents the QALYs gained for each participant in the program. One QALY or “quality-adjusted life year” is equal to one year of life with a perfect quality of life.

3. The ICER is equal to the “Cumulative Net Cost” column divided by the “Cumulative QALYs Gained” column. It is stated as dollars spent per QALY gained. When net costs are negative, the ICER is listed as “cost-saving,” because the intervention saves money and improves QALYs.

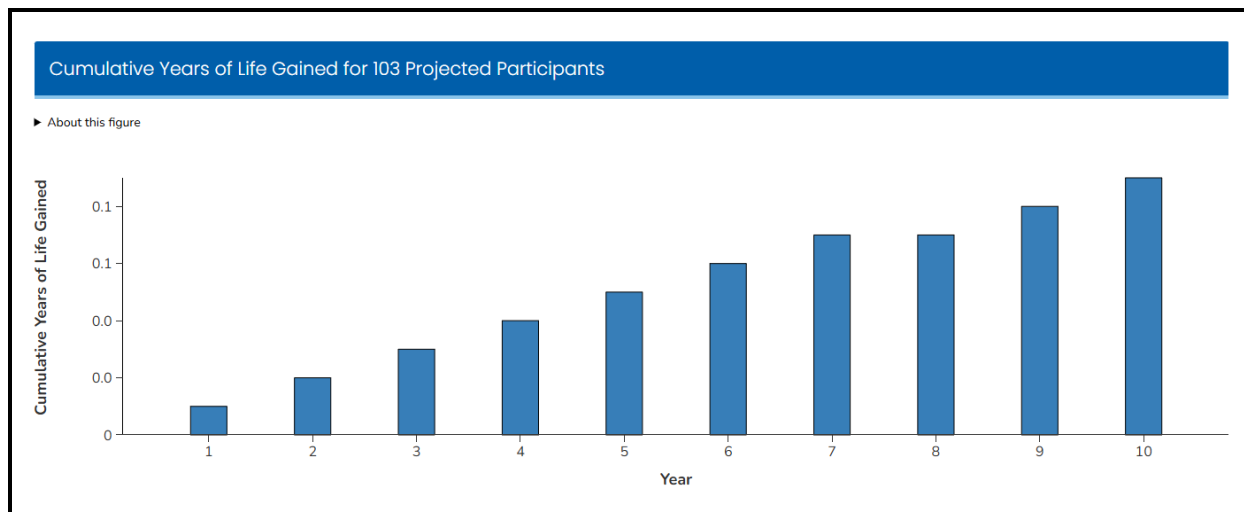
3.7 Cumulative Years of Life Gained

Developing diabetes is associated with an increased risk of life-threatening events, such as heart attack and stroke. We assumed that persons with diabetes have, on average, twice the risk of dying in a given year compared with persons without diabetes. When cases of diabetes are averted or delayed (due to the National DPP lifestyle change program), a small decrease in the number of diabetes-related deaths is achieved. These deaths averted are associated with a gain in the years of life lived during the 10-year period.

Figure 19 shows the cumulative years of life gained for your participant population as a result of participation in the National DPP lifestyle change program. These years of life gained do not account for the quality of life with diabetes shown in Figure 17.

Click the **Data Table** link to see more information.

Figure 19. Cumulative Years of Life Gained



4. EXPORTING RESULTS FROM THE IMPACT TOOLKIT

4.1 Exporting Results to Excel

To generate an Excel workbook with your results data:

1. Click the **Download Data (CSV)** link at the top of each data table. The system will download the report to your computer.
2. Open the report and save it to the appropriate location on your computer.

The *User Inputs* tab displays all default input values, as well as the values used in your analysis. Each tab displayed corresponds to the output figures described in Sections 3.1 through 3.7. These tabs contain the data used to create the graphs, but they do not include the figures. This format allows you to create customized graphs and perform additional analyses.

5. COMPARING SCENARIOS IN THE IMPACT TOOLKIT

The Impact Toolkit can calculate health and economic projections for any combination of the more than 20 user-modifiable inputs. If you are projecting the health and economic impacts of the National DPP lifestyle change program for your state, employee, or insured population, you may be interested in testing the sensitivity of these impacts to changing inputs, such as program costs. Other key inputs that may differ in your population and program include the weight loss and regain schedule, the use of a screening program, and the percentage of eligible, screened persons that participate.

You can compare scenarios in the Impact Toolkit in several ways. Choose the method that best fits your needs:

1. Use the panel of Selected Inputs to modify input values while viewing results in the Output Dashboard.
 - a. In this method, the panel of Selected Inputs is populated with your current input values. To instantly view the recalculated results in the Output Dashboard, click **Modify Selected Inputs**, modify the data, and then click **MODIFY** to recalculate the results based on your modified selections. This method is appropriate for comparing individual outcomes, such as the net cost in Year 3. It does not work well for comparing multiple outcomes because it is difficult to pull up more than one number from the previous results. To modify all inputs entered on this page, click **Modify All Inputs**. To return to the Input Dashboard, click the **Reset and return to Input Dashboard** button at the top of the page.

2. Output your initial results to an Excel workbook. Modify inputs using the Selected Inputs panel or the full Input Dashboard, get new results, and output the new results to an Excel workbook for comparison.
 - a. This method for comparing scenarios is more time-consuming, but it allows for a more detailed comparison of results across all outcomes projected by the Impact Toolkit. The Excel workbook only contains the tables from the Output Dashboard. If you are proficient with Excel, you can generate more sophisticated comparisons and figures using Output from multiple scenarios.
3. Open two browser windows or tabs and generate two sets of results to view.
 - a. This method is convenient and allows you to compare multiple results at once without switching between windows or tabs. The Input Dashboard will only remember one set of inputs (the last set of inputs used) if you return to it to generate another scenario.

Note: *Different browsers may have different settings for saving previously entered data, such as Input values in the Impact Toolkit.*

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