# INFORMATICS-SUPPORTED DIABETES PREVENTION PROGRAMMING IN WEST VIRGINIA

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## Abstract

Addressing diabetes, prediabetes, and related health conditions such as high blood pressure, high cholesterol, obesity, and physical inactivity are critical public health priorities for the United States, particularly West Virginia. Preventing chronic conditions through early identification of risk and intervention to reduce risk is essential. Primary care and community-based programs need a more connected informatics system by which they work in tandem to identify, refer, treat, and track target populations. This case study in quality improvement examines the effectiveness of national diabetes prevention programming in West Virginia via the West Virginia Health Connection initiative, which was designed to provide such an informatics structure. Cohort analysis reveals an average weight loss of 13.6 pounds—or 6.3 percent total body weight loss—per person. These changes represent decreased risk of diabetes incidence and increased healthcare savings. Lessons learned are applicable to other areas aiming to build and sustain a data-informed health analytics network.

**Keywords:** Diabetes prevention, screening, referral, return on investment

## Introduction

Addressing diabetes, prediabetes, and commonly related health conditions such as high blood pressure, high cholesterol, obesity, and physical inactivity continue to be critical public health priorities for the United States. West Virginia is no exception. While the prevalence of adult diabetes is 10.2 percent nationally, diabetes prevalence in West Virginia is substantially higher at 15 percent.[1]

Furthermore, between 3 percent and 4 percent of West Virginians have diabetes, but remain undiagnosed,[2] with an additional 11 percent of the state's population diagnosed with prediabetes.[3] Identifying these at-risk individuals and connecting them with needed care is paramount for diabetes prevention. Better equipping and empowering primary care and community-based programming to leverage data to address these needs is an ideal tactic. WV stands to benefit from a data-informed learning network whereby primary care and community-based programming work in tandem within an expanded scope of team-based care to identify, refer, treat, and track targeted individuals for chronic disease prevention and control. A network of connected healthcare providers and community-based programming is essential to effect this change.

## Background

The West Virginia Bureau for Public Health, Division of Health Promotion and Chronic Disease, via funding from the Centers for Disease Control and Prevention (CDC)[4] and technical support from the

West Virginia University (WVU) Office of Health Services Research, is leading efforts to increase access to and engagement in diabetes prevention programming across the state.

Using a clinical-community linkages framework,[5] synergy partners comprised of primary care and safety net clinics, local health departments, quality improvement focused state-based organizations, and academic partners convene within the WV Health Connection initiative.[6] WV Health Connection addresses the long-standing challenge in connecting healthcare providers with local-level chronic disease prevention and control programming.

The goal is a more integrated, data-informed care system in which health systems and community-based organizations work in tandem for improved population health outcomes. Using a secure, online Workshop Wizard software,[7] the WV Health Connection initiative links community members and patients to appropriate chronic-disease programming, and ensures that outcomes measures are channeled-back to the referring providers.

Data are tracked not only in terms of cataloging available programming and referrals to workshops, but also in terms of participant-level attendance, outcomes metrics, and customized participant surveys. The WV Health Connection initiative has supported an increase in the number of recognized National Diabetes Prevention Program (National DPP) locations in the state from 11 in 2017 to 16 in 2020. As of May 2020, there were 668 individuals taking part in the National DPP within eight health systems comprising 16 locations which were being tracked through WV Health Connection.

This case study in quality improvement examines the effectiveness of National DPP programming in West Virginia and highlights the importance of clinical-community linkages for diabetes prevention. Health outcomes and initial return on investment analyses are provided as an indication of success to-date, with an emphasis on the critical need for a health information management system connecting partners. Lessons learned are applicable to other communities, regions, and states aiming to build and sustain a data-informed health analytics network for chronic disease prevention and control.

**Methods**

To help examine the impact of the National DPP in West Virginia, de-identified person-level data for all applicable sites/organizations engaged in WV Health Connection were exported from Workshop Wizard and prepared for analysis. **Table 1** provides specification for each data field. Descriptive data analyses were conducted using JMP Pro 14 Statistical Discovery Software from Statistical Analysis System. Data were also analyzed for return-on-investment using the CDC Prevention Impact Toolkit.[8] This study received non-human subjects research designation (WVU Institutional Review Board Protocol #: 2009105837).

A cohort analysis was conducted of only those individuals who have completed National DPP programming as of May 2020. Of the 668 total program participants across all sites, 320 (47.9 percent) have completed programming at the time of data export. These individuals are the focus of this analysis. Please note that programs are ongoing and more individuals will have opportunity to complete National DPP programming over time. Participant records were analyzed for the following metrics and criteria.

*Demographics*

- ïAge category
- ïGender
- ïRace / Ethnicity

*Anthropometric measurements*

- ïWeight (measured in pounds)
- ïHeight
- ïBody mass index (BMI) value and corresponding BMI category (i.e., normal; overweight; obese)

*Return-on-investment indicators*

- ïDiabetes incidence
- ïMedical costs
- ïNet costs
- ïCumulative quality of life adjust years

**Results**

**Demographics:** The cohort of National DPP participants were primarily ages 45-64 (53.1 percent), female (82.8 percent), and white/non-Hispanic (95.9 percent) (**Table 2**).

**Changes in Weight and Obesity**. At the outset of National DPP participation, 80.3 percent of all individuals were obese (BMI >30); 19.4 percent were overweight (BMI less than 30.0 and greater than or equal to 24); and 0.3 percent were at a normal weight (BMI less than 24.0). By the time of program completion, there were marked changes in body weight and corresponding BMI category. Examining weight change from the first recorded to the last recorded weight per participant, the average weight loss is 13.6 pounds per person (Range -78 to 23; SD 13.8) (**Figure 1**).

This average weight loss is equivalent to 6.3 percent total body weight loss per person (Range: 31.1 percent to 10.3 percent; SD 6.1 percent) (Figure 1), achieving the CDC National DPP goal of 5 percent to 7 percent weight loss. These changes in weight from first to last weight recorded per participant represent a decrease in obesity from 80.3 percent to 68.4 percent, and an increase in normal weight classification from 0.3 percent to 7.8 percent across all participants.

**Weight loss and session attendance.** Examining the data, there is a clear association between weight loss and time spent participating in National DPP. This stands to reason, as participants have more opportunity to lose additional weight as National DPP sessions continue. On average, participants lost 6.3 percent body weight (Range: 31.1 percent to 10.3 percent; SD 6.1 percent) (**Figure 2**).

**Return on investment analysis:** The CDC Diabetes Impact Tool was used as a means for examining the National DPP participant-level data further. While this tool was designed primarily for use by employers and insurers, it nonetheless provides insight into the broader impact in weight reduction among our 320 cohort participants. Assuming the standard $417 per person National DPP program implementation cost, the standard 3.8 percent probability of developing diabetes,[8] and projecting the observed 6.3 percent average weight loss among the 320 program participants to carry forward into Year 2 at 3.4 percent and Year 3 at 2.7 percent as indicated by the tool, we find the following highlights:

- Decreased diabetes incidence from 12.2 projected cases at Year 1 without intervention, to 6.0 projected cases at Year 1 with intervention—representing 6.2 cases averted. By Year 3, this projection increases to 11.2 cases averted, representing a 32.4 percent overall risk reduction
- Net costs, or the amount of funding required to conduct the National DPP minus the health care savings supported by the program, were also supportive and encouraging. While there is initial capital needed to build and sustain the program, by Year 3 the net costs to run the program are $50 per participant. By Year 4 there is a projected $41 revenue generation per participant. By Year 10, revenue generation per participant increases to $651
- Decreased medical costs per participant from $5,852 per person per year to $5,731 per person per year—representing $120 savings per participant. By Year 3, this projection increases to $341 saving per participant per year. Projecting to 10 years, healthcare savings per participant reaches $989
- Quality-adjusted life-years, or QALYS, represent the quality and duration of life lived. While not a perfect measure, it is often used to indicate the benefit of a program to individuals. An increase in QALYS represents positive change. This cohort analysis demonstrates an increase of 0.2 QALYS at Year 1, an increase of 1.1 QALYS at Year 3, and an increase of 4.4 QALYS at Year 10

## Discussion

The positive impact demonstrated by National DPP in West Virginia is supported by a health informatics system designed to help build and sustain clinical-community linkages. West Virginia is gaining a uniform public health voice and ability to demonstrate, beyond anecdote, program effectiveness and the return on investment of evidence-based programming.

This cohort analysis demonstrates an average weight loss of 13.6 pounds (6.3 percent overall

decrease in body weight) per participant—substantially reducing the prevalence of obesity from 80.3 percent to 68.4 percent and meeting the weight loss goal of 5 percent to 7 percent set forth by the CDC. Whereas diabetes prevention data prior to this effort were fragmented, the West Virginia Health Connection initiative and the synergy partners championing it are creating opportunity for a state-level approach to diabetes prevention. This strengthened informatics system is supportive of public health goals on various levels.

First, state-based public health agencies are better positioned to implement data-informed learning collaboratives designed to help spread innovative thought. Second, health systems are better-positioned to leverage electronic health records data in actionable ways by identifying at-risk patients,[9] referring those individuals to appropriate programming, and monitoring outcomes over time. Lastly, gaps in available programming are highlighted as a truer census of National DPP is garnered.[10] Understanding the gaps allows for a more refined approach to program planning to help fill those areas in the state without sufficient programming opportunities.

**Conclusion**

The West Virginia Health Connection initiative serves as an example of a data-supported network of clinical and community-based partners working in tandem for chronic disease prevention and control. The successful weight loss goal achieved among cohort patients translates to improved person-level health outcomes and increased healthcare savings.

Lessons learned in West Virginia are applicable to other communities, regions, and states aiming to build and sustain a data-informed health analytics network for chronic disease prevention and control. Improvements to long-standing public health challenges such as diabetes prevention are fostered through deliberate movement towards integrated health informatics systems across points of care. Additional research is warranted into the long-term impact of this informatics-supported initiative on the incidence of diabetes and related healthcare costs.

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