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## Needs Assessment for the National Diabetes Education Program (NDEP)

### The National Diabetes Education Program National Diabetes Survey (NNDS) 2014

#### Final Report

December 2015

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# TABLE OF CONTENTS

## Contents

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Executive Summary .....	1
1. NDEP Background .....	4
The National Diabetes Education Program History .....	4
Use of the NNDS to Guide and Inform the NDEP Program Focus.....	5
2. Methodology.....	5
Sampling.....	5
Data Collection.....	6
Screening and Consent.....	6
Survey Response and Weighting.....	7
3. NNDS 2014 .....	7
NNDS 2014 Sample Profile .....	7
4. General Health, Diabetes Diagnosis, and Family History of Diabetes .....	8
Diabetes Status and Diabetes Risk Status .....	9
Family History.....	12
Health Problems and Diabetes—Beliefs .....	14
Awareness of Diabetes Prevention .....	15
Personal health care coverage .....	15
5. Diabetes Management and Self-Efficacy .....	16
Knowledge of A1C .....	17
A1C Testing Frequency in Year Prior to Survey.....	17
Usual Health Care Providers (HCPs) .....	18
Diabetes-Related Advice or Counseling.....	19
Diabetes Self-Management and Self-Efficacy .....	19
6. Perceived Risk .....	23
Overall perceptions of risk .....	23
Degree of Risk .....	24
Reasons for Perceived Chance of Getting Diabetes, and Whether It Can Be Reduced .....	24

7. Diabetes Preventive Behaviors .....	24
Advice or Counseling to Prevent or Delay Diabetes .....	24
Preventive actions by respondent .....	26
8. Results Summary .....	29
Limitations.....	31
9. Potential Program Implications .....	32
Appendices .....	35

**Figures**

Figure 1: Survey Sample Size and Duration of Survey, by Round.....	6
Figure 2: Definitions for <i>Post hoc</i> Classification of Diabetes Status.....	8
Figure 3: People with Prediabetes (PWP) by Age Group.....	9
Figure 4: Had a Blood Test for Diabetes in the 12 Months Past Year Prior to the Survey, by Diabetes Status.....	11
Figure 5: Trends in Reported Family History of Diabetes by Race/Ethnicity: 2008, 2011, and 2014...	13
Figure 6: Trends in Family History of Diabetes by Diabetes Status Group: 2008, 2011, and 2014.....	13
Figure 7: Reported Health Problems Thought by Respondents to Be Caused by Diabetes: 2014.....	14
Figure 8: Aware that Diabetes Can Be Prevented, by Race: 2014.....	15
Figure 9: Ever Heard of A1C (PWD) .....	17
Figure 10: Number of A1C Tests in the Past Year (PWD) .....	18
Figure 11: Source of Advice or Counseling for Diabetes Management (PWD): 2014 .....	19
Figure 12: Self-Management of Diabetes (PWD): 2014 .....	20
Figure 13: Confidence with Managing Hyperglycemia/Hypoglycemia (PWD): 2014.....	20
Figure 14: Reported Levels of Distress with Managing Diabetes (PWD) .....	21
Figure 15: Tools and Resources Reported Used to Help Manage Diabetes in 4 Weeks Prior to Survey (PWD): 2014 .....	22
Figure 16: Use of Social Media in Diabetes Management .....	22
Figure 17: Feel at Risk of Diabetes (non-PWD) .....	23
Figure 18: Source of Advice or Counseling About How to Prevent Diabetes, 2014 (non-PWD).....	25
Figure 19: Type of Advice or Counseling Received, by Diabetes Status (2014) .....	26
Figure 20: Diabetes Prevention Activities (PWP and PAR) .....	27
Figure 21: Reasons People Not Diagnosed with Diabetes Are Not Taking Action to Prevent/Delay Diabetes (2014) .....	28
Figure 22: Source of Encouragement for Diabetes Prevention (2014): Percent.....	29

**Boxes**

Box 1. Relevant Survey Questions: Beliefs .....	14
Box 2. Relevant Survey Questions: Insurance Coverage .....	16
Box 3. Relevant Survey Questions: A1C .....	17
Box 4. Relevant Survey Questions: Usual HCP .....	18
Box 5. Relevant Survey Questions: Diabetes-related Advice or Counseling.....	19
Box 6. Relevant Survey Questions: Self-Efficacy & Diabetes Management Practices.....	20

Box 7. Relevant Survey Questions: Diabetes Self-Management Tools .....	21
Box 8. Relevant Survey Questions: Perceived Risk.....	23
Box 9. Relevant Survey Questions: Diabetes Preventive Behaviors.....	25
Box 10. Relevant Survey Questions: Diabetes Preventive Behaviors.....	26

## Acronyms

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A1C	Glycosolated hemoglobin or hemoglobin A1C
BP	Blood pressure
CATI	Computer-assisted telephone interview
CDC	Centers for Disease Control and Prevention
CVD	Cardiovascular disease
FPL	Federal poverty level
GfK	Gesellschaft für Konsumforschung (Society for Consumer Research)
HCP	Health care provider
HHS	U.S. Department of Health and Human Services
KP	KnowledgePanel®
NDEP	National Diabetes Education Program
NIDDK	National Institute of Diabetes and Digestive and Kidney Diseases
NIH	National Institutes of Health
NNDS	NDEP National Diabetes Survey
OMB	Office of Management and Budget
PAR	People at risk
PWD	People with diabetes
RDD	Random digit dialing
U.S.	United States

## Executive Summary

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Founded in 1997, the National Diabetes Education Program (NDEP) is a federally sponsored initiative that involves public and private partners in efforts to improve diabetes management and outcomes, promote early diagnoses, and prevent or delay the onset of diabetes in the United States and its territories. The overall goal of the NDEP is to reduce the burden of diabetes and prediabetes by facilitating the adoption of proven approaches to prevent or delay the onset of diabetes and its complications. To address the lack of national data on diabetes-related knowledge, attitudes, and behaviors among U.S. adults, as well as on the management and control of diabetes by people with the disease, the NDEP National Diabetes Survey (NNDS) was implemented. The survey has been conducted every 2 to 3 years since 2006 and provides the NDEP with data that guide program strategies and help to assess the program's reach and effectiveness.

This report presents the findings from the 2014 NNDS, and includes trend analyses where comparable data are available from the 2008 and 2011 surveys. Until 2014, the NNDS was administered as a random digit dialing (RDD) telephone survey that was probability-based and nationwide. The NNDS 2014 moved to a national probability-based online (web) panel survey to achieve more comprehensive coverage of minorities, younger adults, and cell phone-only household members. Additionally, the 2014 survey questionnaire was modified from previous versions to include questions that captured progress toward behavior change.<sup>1</sup> Questionnaire items developed in 2006 remained largely unchanged until 2011 so that responses could be compared over time. The 2014 survey was updated based on recent literature and program stakeholder input to reflect current diabetes understanding and interests, especially as these related to behavior change. From 2008 to the present, the NNDS focused on adults ages 35 years and older. The 2006 survey included adults ages 45 years and older only and is not discussed in this report.<sup>2</sup>

The 2014 target sample size was met (n=2,535), as were the targets for the oversampled groups of Hispanics (n=842) and African Americans (n=840). Because the NNDS 2014 sample was derived from an online panel and administered as a web survey, we discuss response in terms of a survey completion rate rather than a response rate. The calculated survey completion rate represents the number of people who completed the survey divided by the number of eligible people invited to complete the survey. The survey completion rate for the NNDS 2014 total sample was 47 percent.<sup>3</sup> The sample for the NNDS 2014 was weighted as in previous rounds of the survey to allow comparability of the survey sample profiles across the three time periods: 2008, 2011, and 2014.

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<sup>1</sup> Behavioral change information such as people's intention to change, steps they may take in preparation, changes they make, and the length of time they have sustained these changes with regard to diabetes.

<sup>2</sup> Published information on the NNDS 2006 can be found in Gallivan et al., 2009; Griffey et al., 2015, and Piccinino et al., 2015.

<sup>3</sup> Previous NNDS were conducted as RDD surveys; therefore, survey response rates were calculated. The RDD response rates reflected the number of people who were interviewed in the telephone survey divided by the number of eligibles interviewed plus the number of eligibles not interviewed plus all other cases of unknown eligibility. The survey response rates for 2008 and 2011 were 54 percent and 30 percent, respectively.

The diabetes status categories used in this report have been in place since the surveys were first implemented in 2006, and were assigned in the analysis phase of the study based on information collected in the survey. *Furthermore, all instances in which prevention of diabetes is mentioned throughout this report refer specifically to the prevention of type 2 diabetes.*

**Diabetes Status:**

- **People with diabetes (PWD)** had been told by a doctor or other health professional they had diabetes or sugar diabetes.
- **People with prediabetes (PWP)** had been told by a doctor or other health professional they had prediabetes, impaired fasting glucose, impaired glucose tolerance, borderline diabetes, or high blood sugar.
- **People at risk (PAR)** whose self-reported height and weight gave them a body mass index of 25 or greater had been told by a doctor or other health professional they were at high risk for diabetes, or had been told by a health care professional that they had gestational diabetes or high blood sugar during pregnancy.
- **All Others** met none of the above criteria.

### **Major findings—Highlights**

- Doctors, family, and friends appeared to play a major role in providing advice or counseling on diabetes prevention and management.
- Awareness of the link between diabetes and heart disease remains low.
- Social media were not widely used for diabetes management among people with diabetes; paper tools remained popular.
- Diabetes prevention awareness stayed high.
- Nearly half of those at risk for type 2 diabetes did not feel at risk of diabetes.
- Slightly more than half of those at risk were taking some action to prevent diabetes.
- Knowing their prediabetes diagnosis seemed to influence behaviors among those at risk.
- Regular care by a diabetes educator was low (7 percent) among those who sought care in addition to that from their usual health care provider.

### **Potential Program Implications**

Synthesis of key results has generated a list of potential implications for the NDEP:

- Continue to focus on addressing the link between cardiovascular disease (CVD) and diabetes.
- Disseminate messages to health care providers (HCPs) about diabetes education and improving outcomes.
- Increase support for family interventions.

- Use NNDS information to focus and refresh NDEP campaigns as needed.
- Promote confidence building and support for diabetes management.
- Focus on health insurance and health care coverage education.
- Focus on self-management of glycemic monitoring and control.
- Focus on increasing screening for prediabetes/diabetes.

**Please keep in mind:**

- **Question responses reflect people’s perceptions at the time each survey was conducted—there are no right or wrong answers.**
- **Except for those who reported they were diagnosed by a health professional as having diabetes or prediabetes, people did not necessarily know their diabetes status at the time of the survey. Respondents were categorized in analysis as having prediabetes or being at risk of diabetes based on their responses to a series of questions.**
- **All percentages are weighted unless otherwise noted.**

## 1. NDEP Background

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This report presents information on trends in diabetes-related knowledge, attitudes, and behaviors at three points in time—2008, 2011, and 2014—and is based on the results from the NDEP National Diabetes Survey (NNDS) of the adult general public. An earlier round of the NNDS was conducted in 2006, although it was limited to adults ages 45 years and older; these results were discussed in a prior report. Over the years, the NDEP has used the survey results to assess the program’s progress, guide its strategic directions, and inform future program initiatives.

### The National Diabetes Education Program History

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Founded in 1997, the U.S. Department of Health and Human Services’ NDEP is a federally sponsored initiative that involves public and private partners in efforts to improve diabetes management and outcomes, promote early diagnoses, and prevent<sup>4</sup> or delay the onset of diabetes in the United States and its territories. The NDEP is jointly sponsored by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health (NIH) and the Division of Diabetes Translation of the Centers for Disease Control and Prevention (CDC), together with the support of more than 200 partner organizations.

The overall goal of the NDEP is to reduce the burden of diabetes and prediabetes by facilitating the adoption of proven approaches to prevent or delay the onset of diabetes and its complications, with the following program objectives:

- Increase awareness and knowledge of the seriousness of diabetes, of its risk factors, and of effective strategies for preventing complications associated with diabetes and preventing diabetes
- Increase the number of people who live well with diabetes and effectively manage their disease to prevent or delay complications and improve quality of life
- Decrease the number of Americans with undiagnosed diabetes
- Among people at risk for diabetes, increase the number who make and sustain effective lifestyle changes to prevent diabetes
- Facilitate efforts to improve diabetes-related health care and education, as well as systems for delivering care
- Reduce health disparities in populations disproportionately burdened by diabetes
- Facilitate the incorporation of evidenced-based research findings into health care practices.

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<sup>4</sup> All instances where prevention of diabetes is mentioned throughout this report refer specifically to the prevention of **type 2** diabetes.

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## Use of the NNDS to Guide and Inform the NDEP Program Focus

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The NDEP launched the first NNDS in 2006 because of the paucity of national data on diabetes-related knowledge, attitudes, and behaviors among U.S. adults, as well as on the management and control of diabetes by people with the disease. The survey has been conducted periodically (roughly every 2 to 3 years) to provide the NDEP with information for focusing program strategies, and with indications of program reach and effectiveness.

While asking the same questions at 2- to 3-year intervals provided invaluable trend data, after the completion of the 2011 survey the NDEP concluded that the survey needed to include new questions to better elicit information on intent to act and actions taken with respect to diabetes management and prevention. Additional and targeted questions to capture progress toward behavior change (e.g., people's intention to change, steps they may take in preparation, changes they make, and the length of time they have sustained these changes) were added to the 2014 survey.

## 2. Methodology

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The NNDS 2014 differed from the 2006, 2008, and 2011 surveys in how the sample was obtained and how it was administered. The NNDS traditionally was conducted using an RDD telephone survey that was probability-based and nationwide. With the RDD, telephone numbers in exchanges with a high proportion of Hispanic and African American households were oversampled to obtain a sufficient number of respondents in these subgroups to allow their proper representation in analysis. In the face of the continued decline in response to RDD landline phone surveys, the NNDS 2014 switched to using a national probability-based online (web) survey. This approach meant more comprehensive coverage of minorities, younger adults, and cell phone-only household members—people that increasingly may be diminished or absent in RDD landline samples but are nonetheless important to the NDEP.

### Sampling

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For the 2014 survey, the sample was drawn from the GfK KnowledgePanel® (KP), a probability-based online panel of the U.S. population and one considered to be representative of U.S. demographic benchmarks such as age and ethnicity distributions. The online panel utilizes address-based sampling (ABS).<sup>5</sup> ABS has been gaining acceptance as the industry gold standard, largely due to its high coverage of U.S. households through inclusion of cell phone-only households, Spanish-speaking households, low income households, and households that did not previously have Internet access.<sup>6</sup>

The KP research panel is recruited and maintained by GfK, a private research organization specializing in probability-based sampling. The KP from which the survey sample was drawn

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<sup>5</sup> Link, M. (2008). Address-Based Sampling. In Paul J. Lavrakas (Ed.), *Encyclopedia of Survey Research Methods*. (pp. 8-9). Thousand Oaks, CA: Sage Publications, Inc. doi: <http://dx.doi.org/10.4135/9781412963947.n6>

<sup>6</sup> Iannacchione, V.G. 2011. The changing role of address-based sampling in survey research. *Public Opinion Quarterly*, 75(3), pp. 556-575. DiSogra, C. 2010. Update: Address-based sampling nets success for KnowledgePanel® recruitment and sample representation. *Accuracy's Impact on Research* (Spring). <http://www.knowledgenetworks.com/accuracy/spring2010/pdf/disogra-spring10.pdf>. Link, M. et al., 2009. Building a new foundation: Transitioning to address based sampling after nearly 30 years of RDD. Paper presented to the 64<sup>th</sup> Annual Meeting of the American Association for Public Opinion Research, Hollywood, FL.

included approximately 42,000 U.S. households at the time, corresponding to approximately 55,000 adult members ages 18 and older.<sup>7</sup> As part of their initial panel recruitment process, GfK collected demographic data in advance, as well as other data elements for sample selection purposes and project-specific data analysis. This advance information helped free-up survey time and question space for the 2014 survey.

The 2014 target sample size was 2,500 completed interviews, with a target oversample of an estimated 830 Hispanics and 830 African Americans.

For households with adults ages 35 and older in the NNDS sample, the target sample size overall was met (2,535), as were the targets for the oversampled groups of Hispanics (842) and African Americans (840).

## Data Collection

The field of survey research has been shifting toward using web-based surveys. In addition to the advantages noted above, and helping to ensure better response rates, the online (web) survey has other benefits:

- Limits burden on people because they only see the questions that are relevant to them based on their responses to prior questions
- Allows people to complete the survey at a time convenient for them
- Provides people with more privacy in answering questions.

The NNDS 2014 was administered as an online survey during December 10–19, 2014. The survey was fielded via the Internet to KP members whose email addresses were sampled. Individuals received an email notification that the survey was available for completion, with the link to the survey embedded in the email. Spanish language-only speakers were provided access to the survey in Spanish; and Internet access and hardware were provided to panel members with no access to the survey otherwise. The surveys averaged 20 minutes and were self-administered and accessible at any time of day for the designated period. Two reminder emails were sent to people who were invited to participate but had not yet responded to the survey.

**Figure 1: Survey Sample Size and Duration of Survey, by Round**

Survey Round (Year and Period)	Survey Population	Sample Size
2006: March through June	Adults 45 years of age and older	1,763
2008: August through November	Adults 35 years of age and older	2,078
2011: July through September	Adults 35 years of age and older	2,234
2014: December	Adults 35 years of age and older	2,535

## Screening and Consent

Once the participant entered the online survey, they were asked to verify their age. Eligible participants were adults ages 35 years and older in the U.S. Participants were then asked to give informed consent for participation in the online survey by selecting the appropriate link for consent on the web survey screen.

<sup>7</sup> GfK, personal communication, April 30, 2014.

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## Survey Response and Weighting

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The survey completion rate<sup>8</sup> for the NNDS 2014 total sample was 47 percent<sup>9</sup> (45 percent for African Americans, 40 percent for Hispanics, and 57 percent for “All Others”).

The sample of respondents for the 2014 survey was weighted as in previous rounds of the survey to allow comparability of the survey sample profiles across the three time periods: 2008, 2011, and 2014. In this way, each survey year’s sample is representative of the nation as a whole. Sample weights were applied to the survey data using the methods described in Appendix A. All percentages reported in this document are weighted unless otherwise specified.<sup>10</sup>

## 3. NNDS 2014

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The NNDS 2014 questionnaire differed from the previous surveys in both design and mode of implementation. Many of the questions were redesigned, with input from NDEP staff members and partners, to increase the survey’s focus on perceived risk of diabetes, diabetes prevention, and diabetes management behaviors.

The NNDS 2014 sections included:

- General Health, Diabetes Diagnosis, and Family History of Diabetes
- Perceived Risk (among people not diagnosed with diabetes [non-PWD<sup>11</sup>])
- Behaviors to Prevent/Delay Diabetes (non-PWD)
- Diabetes Self-Management/Self Efficacy (PWD Only)
- Personal Health Care

### NNDS 2014 Sample Profile

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As with the NNDS 2008 (n=2,078) and the NNDS 2011 (n=2,234), the NNDS 2014 (n=2,535) included adults ages 35 and older in the U.S. In 2014, almost one-quarter (23 percent) of respondents were younger adults ages 35–44 years, one-half in the middle age range of 45–64 years, and more than one-quarter (27 percent) were older adults ages 65 years and older.

Based on self-reports of race and ethnicity, the proportion of respondents by race/ethnicity also changed little over the time periods. In 2014, about 13 percent of respondents reported

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<sup>8</sup> The survey completion rate is the number of people who completed the survey divided by the number of eligible participants invited to complete the survey.

<sup>9</sup> Overall response rates for 2008 and 2011 were 54 percent and 30 percent, respectively. Response rates for 2008 and 2011 were calculated using the definitions from the American Association for Public Opinion Research (AAPOR). Each phone number in the sample was assigned a single disposition code according to AAPOR’s standard definitions ([http://www.aapor.org/Standard\\_Definitions2.htm](http://www.aapor.org/Standard_Definitions2.htm)).

<sup>10</sup> Tests of significance (standard errors and confidence intervals) were computed for cross-tabulations within the 2014 survey year to determine significance at the p<.05 level. T-tests were computed to test for significant differences in trends across pairs of survey years using SUDAAN, a computer software package for analyzing data obtained from complex survey designs.

<sup>11</sup> Non-PWD refers to people not diagnosed with diabetes. In this report non-PWD includes PWP, PAR, and All Others.

themselves as Hispanic, 11 percent as non-Hispanic African-American, and 70 percent as non-Hispanic White. All other races and ethnicities comprised the remaining 7 percent of the sample ages 35 years and older. Most of the sample completed the English version of the online survey (94 percent), with the remainder submitting the Spanish version.

The distribution by gender in 2014 was similar to previous surveys, at about half female (52 percent) and half male (48 percent) (Please see Appendix B for a sample breakdown by gender and other socio-demographic variables for 2008, 2011, and 2014).

The 2014 sample included respondents from households that did not have a landline telephone as well as those that did. About three-fourths (76 percent) of respondents were from households that had landline phones and/or cell phones, while almost one-fourth (24 percent) were from households that did not have a working landline phone. In 2008 and 2011, all respondents were from landline-only households due to the RDD data collection method used.

#### 4. General Health, Diabetes Diagnosis, and Family History of Diabetes

The NNDS was designed to gather information on diabetes and diabetes-related topics from the general U.S. population of adults ages 35 years and older. The survey began with questions about the health of this population and its risk factors for diabetes. Data were collected to discover whether or not a person was told by a health professional that they had diabetes and, if so, whether it was type 1 or type 2. Respondents were routed through the survey depending on their answers to these key questions. Questions asked in the General Health, Diabetes Diagnosis, and Family History of Diabetes section of the survey were used in the analysis phase of the study to classify the diabetes status of survey respondents *post hoc* based on the information they reported. The four classifications historically used are: people with diabetes (PWD), people with prediabetes (PWP), people at risk (PAR), and All Others (see below).

**Figure 2: Definitions for *Post hoc* Classification of Diabetes Status**

Diabetes Status	Abbreviation	Definition
People with diabetes	PWD	People who had been told by a doctor or other health professional that they had diabetes or sugar diabetes.
People with prediabetes	PWP	People who had been told by a doctor or other health professional that they had prediabetes, impaired fasting glucose, impaired glucose tolerance, borderline diabetes, or high blood sugar.
People at risk	PAR	People whose self-reported height and weight gave them a body mass index of 25 or greater who had been told by a doctor or other health professional that they were at high risk for diabetes, or had been told by a health care professional that they had gestational diabetes or high blood sugar during pregnancy.
All Others	All Others	People who met none of the above criteria.

## Diabetes Status and Diabetes Risk Status

In the NNDs 2014, about 15 percent (n=475)<sup>12</sup> of respondents reportedly were told by a doctor or other health professional that they had diabetes. This represented a few percentage points less than in 2011 (17 percent) and 2008 (16 percent).

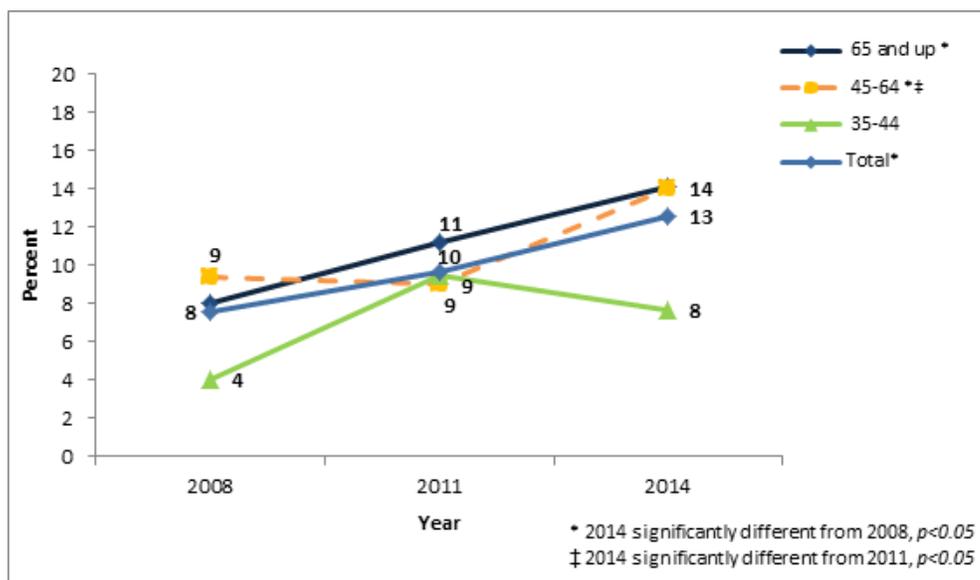
### Age

With the growing interest in diabetes prevalence among younger adults, we paid particular attention to the reported trends in diabetes status for 35–44 year-olds over time. Among PWD, there were no significant changes in any of the age groups. For 2014, the proportion of PWD was lowest at 6 percent (n=43) in the 35–44 year age group, at 14 percent (n=242) for the middle age group (45–64 years), and highest at 25 percent (n=190) in the oldest age group (65 years and older).

The figure below shows trends over the three survey periods in the proportion of people classified with diabetes status “PWP.” A significant 5 percentage point increase was found among the proportion of PWP overall from 2008 to 2014. In addition, the proportion of PWP increased significantly since 2008 in the age groups 45–64 years and 65 years and older. There were no significant changes in the 35–44-year age group.

**Figure 3: People with Prediabetes (PWP) by Age Group**

*PWP significantly increased in all age groups except the youngest (ages 35–44 years)*



### Race/Ethnicity

The highest proportion of PWD was among African Americans, at 22 percent (n=200), based on information reported in 2014; this percentage was followed by Hispanics at 17 percent (n=156)

<sup>12</sup> The “n” refers to the unweighted count that is represented by the weighted percentage for that characteristic. All percentages are based on weighted numbers except where otherwise noted.

and Whites at 13 percent (n=106). African Americans were significantly more likely than Whites to have reported a diabetes diagnosis. There were no significant differences in the levels of PWP and PAR across the racial/ethnic groups.

#### ***Diabetes Type: Type 1 or Type 2***

Unlike its predecessor surveys, the NNDS 2014 asked people who reported being told they had diabetes also to indicate whether it was type 1 or type 2 diabetes. In 2014, 475 people reported being told they had diabetes. Of those who were told they had diabetes, 10 percent (n=49) responded they had type 1 diabetes and 83 percent (n=395) reported they had type 2 diabetes. The remainder indicated that they did not know or preferred not to answer the question.

#### ***High Blood Pressure (HBP)/Hypertension, High Cholesterol, and Other Related Conditions***

The NNDS traditionally has collected data on people who reported having certain conditions that are commonly associated with diabetes such as high blood pressure (HBP)/hypertension, high cholesterol, and other related conditions.

Reports of being told by a health professional that they had high blood pressure/hypertension, at 41 percent (n=1,125) in 2014, remained at about the same level as in previous survey years and reflected no significant change overall. In the period 2008 to 2014, the percentage of reported HBP/hypertension significantly:

- Rose among African Americans, from 38 percent (n=242) to 56 percent (n=486);
- Decreased among Hispanics, from 49 percent (n=283) to 32 percent (n=289), following the sharp significant increase that was observed from 2008 to 2011; and
- Dropped among people ages 65 and older, from 65 percent (n=406) to 56 percent (n=395).

Overall, there was no significant increase since 2008 in the percentage of people who reported they were told by a doctor or other health care professional that they had high cholesterol.

Reports of high cholesterol increased significantly between 2008 and 2014 among:

- Hispanics: 25 percent (n=157) to 39 percent (n=338);
- Adults ages 65 years and older: 49 percent (n=303) to 58 percent (n=385); and
- PAR: 31 percent (n=311) to 38 percent (n=401).

#### ***Gestational Diabetes***

Of the women surveyed who reported being pregnant in the 10 years prior to the NNDS 2014, 10 percent (n=18) were told by a doctor or other health professional that they had gestational diabetes or high blood sugar during their pregnancy.

#### ***Tests for Diabetes***

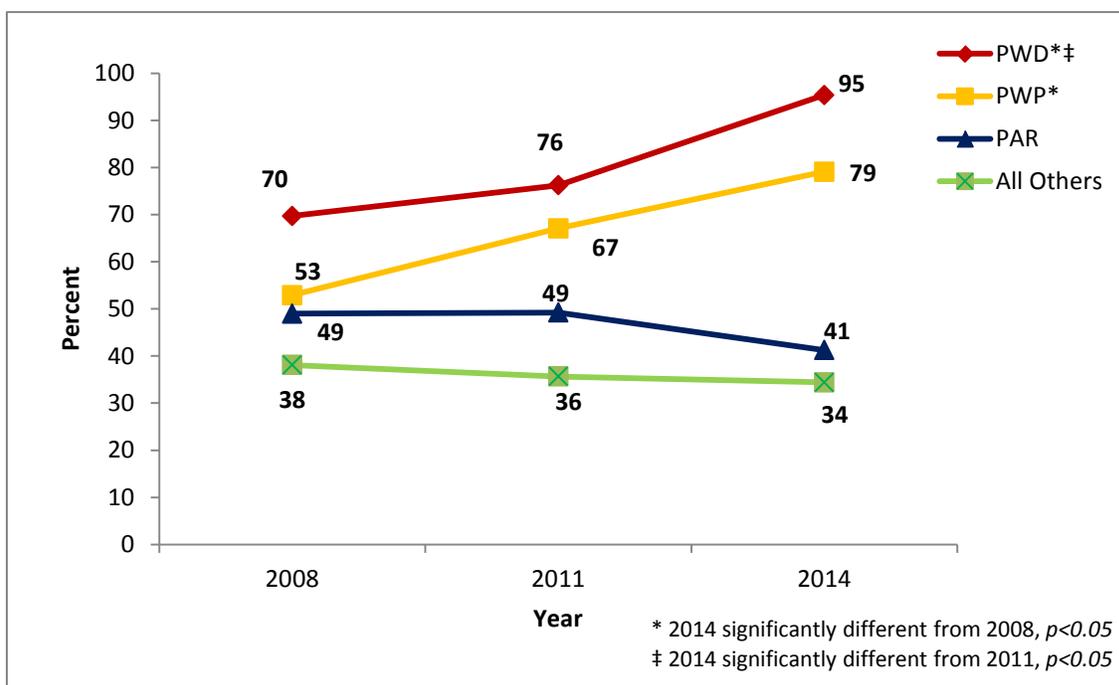
The NNDS 2014 asked people questions about tests for diabetes that they might have had in the 12 months prior to the survey. These questions were used in analysis to determine their diabetes status. Previous rounds of the survey asked whether people *ever* had a blood test to see if they had diabetes or high blood sugar; the 2014 survey was more specific. In 2014, two separate items captured the types of blood test people had—the hemoglobin A1C or glycosolated hemoglobin test, and the fasting blood sugar test. The 2014 question was revised from 2011 to also include the more restricted time frame of “in the past 12 months,” as opposed to the prior surveys “ever,” for the tests in order to reduce recall bias. Overall, half of the people who responded to the questions (n=1,320) in 2014 had one or both of the types of

blood tests. Twenty-nine percent (n=864) had an A1C test, and 42 percent (n=1,099) had a fasting blood sugar test.

In analysis, we combined the two 2014 question items about hemoglobin A1C/glycosolated hemoglobin tests and fasting blood sugar tests into one “blood test” variable to enable approximate comparisons to the 2011 survey question. Using this created variable, we examined trends in receipt of a blood test by race/ethnicity, diabetes status, and age group. The response options also differed between 2011 and 2014; the previous survey included a response for having received a blood test “less than one year ago,” which was used to compare to the “past 12 months” time period used in 2014. Trends showed no significant changes across the three survey periods by age group or race/ethnicity for having received a blood test except in the All Others race/ethnicity category, where the proportion rose from 39 percent (n=55) to 63 percent (n=41). Significant increases were seen by diabetes status in the proportions of PWD and PWP who received a “blood test” in the year prior to the survey, as shown in the figure below.

**Figure 4: Had a Blood Test for Diabetes in the 12 Months Past Year Prior to the Survey, by Diabetes Status**

*Blood tests increased significantly among PWD and PWP*



In the NNDS 2014, 5 percent of people (n=183) reported having had a third test, the oral glucose tolerance test, within 12 months before the survey. (This question was not asked explicitly in prior surveys.)

## Family History

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In the NNDS 2014, people were asked about their biological or blood relatives and diabetes; that is, a biological mother, father, sister or half-sister, or brother or half-brother who had diabetes.<sup>13</sup> If they reported any of these family members, they were considered to have a family history of diabetes. The 2014 family history data are comparable, but not exactly equivalent, to previous survey years; observed differences may be, in small part, artifacts of changes in the way the question was asked.

There was a rise overall in reported family history of diabetes to 36 percent (n=1,074) in 2014, which was significantly higher compared to 27 percent (n=706) in 2011 and 31 percent (n=686) in 2008.

### Age

In 2014, family history of diabetes did not vary significantly across the age groups, as similar proportions within these groups reported a family history of the disease:

- 31 percent among ages 35–44 years (n=213);
- 38 percent among ages 45–64 years (n=605); and
- 36 percent among ages 65 years and older (n=256).

Trends over time showed a significant increase in family history among the middle age group (ages 45–64 years), from 28 percent (n=321) in 2011 to 38 percent (n=605) in 2014. Significant changes also were observed for older ages (65 years and above), from 24 percent (n=155) in 2008 to 36 percent (n=256) in 2014. There were no significant trends for the 35–44 years age group.

### Race/Ethnicity

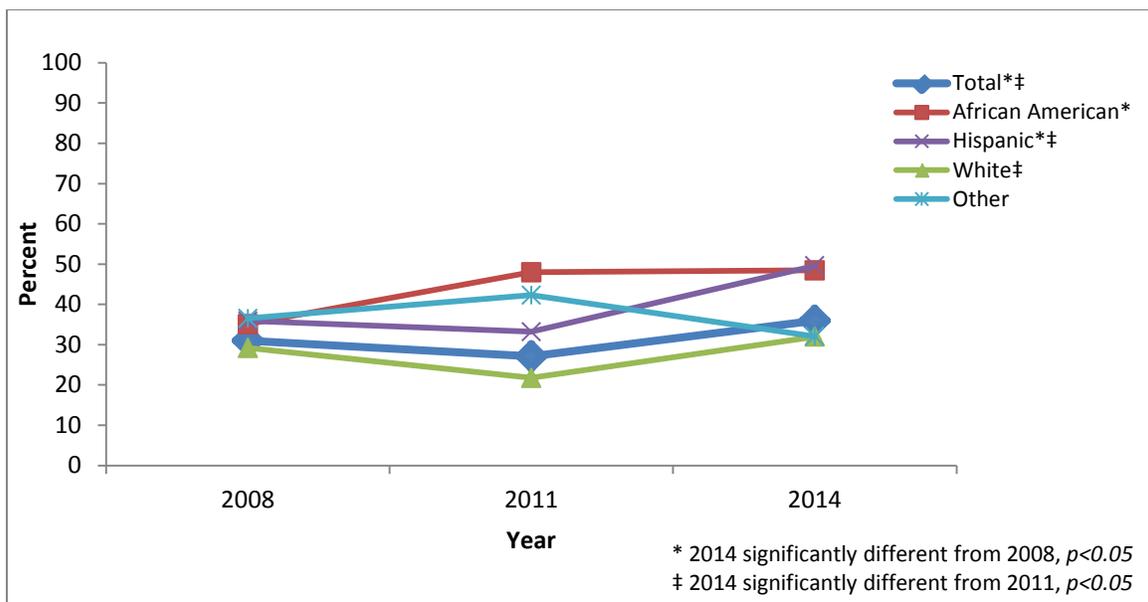
Significant increases in reported family history have been seen among African Americans over the period 2008 to 2014, from 35 percent (n=196) to 48 percent (n=396), with the trend showing signs of leveling off since 2011. Among Hispanics, although percentages dipped between 2008 and 2011, increases were significant from 36 percent (n=186) in 2008 to 50 percent (n=410) in 2014, and from 33 percent in 2011 (n=208) to 50 percent (n=410) in 2014.

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<sup>13</sup> In 2008 and 2011, if a respondent reported they had a member of their immediate family with diabetes, they were asked which family member it was. If they had a mother, father, brother, or sister with diabetes (“immediate family”), they were considered to have a family history of the disease.

**Figure 5: Trends in Reported Family History of Diabetes by Race/Ethnicity: 2008, 2011, and 2014**

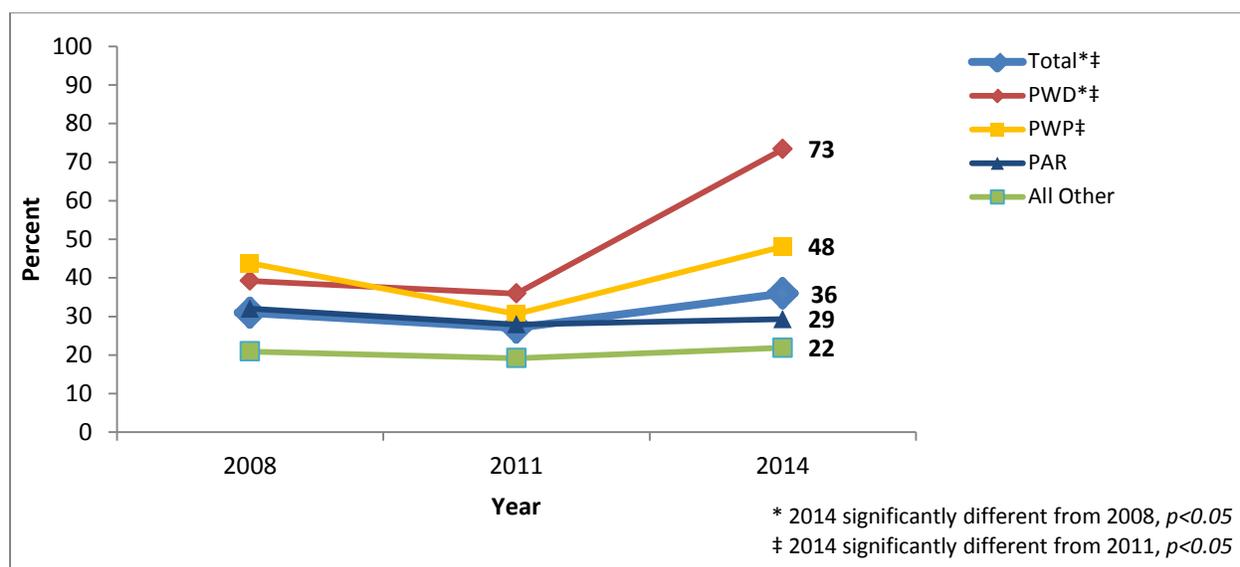
*Significant increases in reported family history among African Americans and Hispanics*



**Diabetes Status**

PWD in the NNDS 2014 were significantly more likely to report family members with diabetes compared to other diabetes status groups: 73 percent (n=336) among PWD, 48 percent (n=178) among PWP, 29 percent (n=392) among PAR, and 22 percent (n=168) among All Others. There was a sizable and significant increase in reported family history among PWD between 2008 and 2014, from 39 percent (n=182) to 73 percent (n=336), and between 2011 and 2014, from 36 percent (n=218) to 73 percent (n=336).

**Figure 6: Trends in Family History of Diabetes by Diabetes Status Group: 2008, 2011, and 2014**  
*Significant increases found in reported family history of diabetes*



## Health Problems and Diabetes—Beliefs

In the NNDS 2014, respondents were asked about a list of health problems and whether they thought the problems could be caused by diabetes. This question was followed by a question that asked “of the problems the respondents selected, which were the three most serious?” In previous surveys, the information collected about the most serious health problems caused by diabetes were spontaneously mentioned by the respondent.

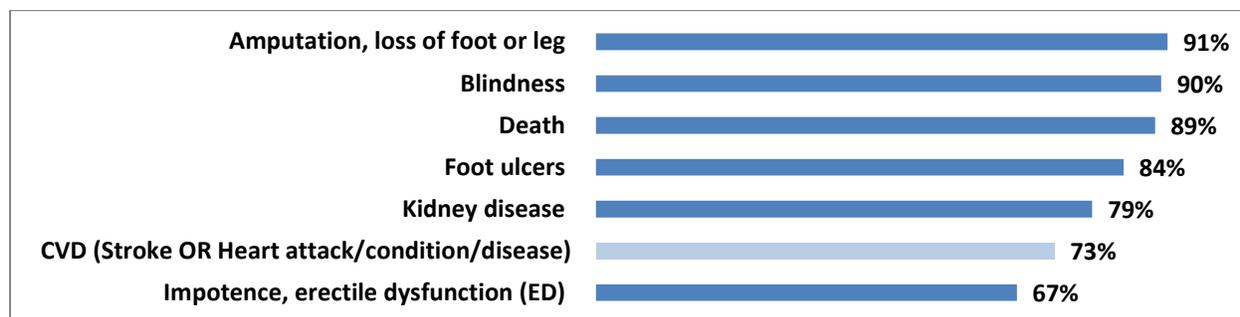
### Box 1. Relevant Survey Questions: Beliefs

- Do you think the following health problems can be caused by diabetes?
- Which of those health problems do you think are the three most serious problems?

### Health Problems and Diabetes

When respondents were asked in the NNDS 2014 to indicate for a list of 13 health problems whether they thought the problems could be caused by diabetes, respondents were most likely to select “Amputation, loss of foot or leg,” “Blindness,” and “Death.” The figure below shows the proportion selected by respondents for the top several conditions.

**Figure 7: Reported Health Problems Thought by Respondents to Be Caused by Diabetes: 2014**  
*Awareness of the diabetes and CVD link remains relatively low given that CVD is the leading cause of death among PWD*



Four CVD<sup>14</sup> outcomes (“stroke” or “heart attack, heart condition, heart disease”) were commonly selected but were not among the topmost reported to be caused by diabetes in 2014. Combining responses for “stroke” or “heart attack, heart condition, heart disease” into one category did not improve the relative ranking for CVD.

In the NNDS 2014, respondents also were asked to indicate which of the (up to three) conditions they named as caused by diabetes that they considered most serious. Among all respondents who answered the question, 55 percent (n=1,351) selected “Death,” 49 percent (n=1,249) reported “Amputation, loss of foot or leg,” and 47 percent (n=1,234) replied “Blindness.” A CVD outcome was among the top three most serious conditions considered to be caused by diabetes by 45 percent (n=1,119) of people who responded to the question.

<sup>14</sup> “CVD” in previous survey reports was a created variable that combined *five* conditions: stroke, heart attack, heart condition, cardiovascular disease, and HBP/hypertension.

## Awareness of Diabetes Prevention

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Awareness that diabetes can be prevented remained high overall. Over three-fourths (n=1,940) of all respondents in 2014 were aware that diabetes can be prevented; however, there was no significant change in overall awareness compared to 2008.

### *Race/Ethnicity*

In 2014, differences across racial/ethnic groups were significant, with underserved populations such as Hispanics at 72 percent (n=612) and African Americans at 71 percent (n=642) less likely to be aware than Whites at 80 percent (n=633) that diabetes can be prevented.

**Figure 8: Aware that Diabetes Can Be Prevented, by Race: 2014**

*Lower awareness of diabetes prevention among African Americans and Hispanics*



### *Age*

There were no significant differences in diabetes awareness by age group in 2014.

### *Diabetes Status*

Awareness that diabetes<sup>15</sup> is preventable was highest among people with prediabetes (PWP), at 87 percent in 2014 (n=283), but not significantly higher than 78 percent among PWD (n=387). For PAR and All Others, awareness in 2014 was 79 percent and 70 percent, respectively. Awareness has increased significantly among PWP from 70 percent (n=146) in 2008 to 87 percent (n=283) in 2014, but stayed about the same for PWD, PAR, and All Others.

### *Income*

Household income as a percent of the federal poverty threshold<sup>16</sup> was calculated based on income and household size information available in the 2014 NNDS. Awareness that type 2 diabetes can be prevented was significantly lower, 69 percent (n=256) compared to 81 percent (n=1,019), among respondents with a household income below 100 percent of poverty than among households with income greater than or equal to 300 percent of poverty.

## Personal health care coverage

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### *Insurance and Coverage for Health and Wellness Program*

Recent changes in the health insurance arena have focused new attention on the insured status of the U.S. adult population. The NNDS historically did not include questions on health insurance and was not designed to serve as a source of this information. The importance of health insurance and health care coverage, however, led NDEP to ask a few questions about

<sup>15</sup> The 2014 survey question specified “type 2 diabetes.”

<sup>16</sup> Thresholds were computed from the 2014 Health & Human Services Poverty Guidelines (<http://aspe.hhs.gov/poverty/14poverty.cfm>) using information on household size obtained from the NNDS 2014.

this topic in the NNDS 2014. The responses help to shed light on people’s understanding of the extent of their coverage, if any, and of the types of services covered. While not comprehensive, these data offer some broader “access to care” context for diabetes prevention and management planning.

In the 2014 survey, the majority of people, 89 percent (n=2,197), reported having health insurance or health care coverage for all or part of their medical care.

However, when asked to report on the types of programs covered, about 40 percent (n=793) of those with coverage *did not know* whether their coverage included any weight loss, exercise, or other health or wellness programs. Thirty-eight percent (n=954) of people who reported having coverage stated that these program types were included in their coverage; however, 24 percent (n=198) of them did not know whether they needed a referral.

GfK collects income and other socio-demographic information from its panel members. Information on household income for this survey panel sample was converted in analysis to percent of federal poverty level (FPL) income.<sup>17</sup> When health insurance or health care coverage was examined in terms of FPL income, people who lived in households with incomes below 250 percent of FPL were found to have significantly lower proportions with coverage, 81 percent (n=835), than the 94 percent (n=1,362) covered among those in households with incomes greater than or equal to 250 percent of FPL. Similarly, those in households below 100 percent of FPL were significantly less likely than those at or above 300 percent of FPL to have coverage; 71 percent (n=263) and 95 percent (n=1,180), respectively. Also, respondents who reported coverage and who were below 100 percent of FPL, 23 percent (n=79), were significantly less likely than those at or above 300 percent of FPL, 41 percent (n=562), to have health insurance or health care coverage that included weight loss, exercise, or health/wellness programs.

**Box 2. Relevant Survey Questions:  
Insurance Coverage**

- Do you currently have health insurance or health care coverage that pays for all or part of your medical care?
- Does your health care coverage include any weight loss, exercise, or health or wellness programs?
- Do you need a referral, prescription, or script from your doctor to attend any of these weight loss, exercise, or health or wellness programs?

## 5. Diabetes Management and Self-Efficacy

The NNDS 2014 asked the question about knowledge of “the term A1C, also known as hemoglobin or hemoglobin A1C” only of those who reported that they had been diagnosed with diabetes; whereas, in previous surveys the question was asked of all respondents. New questions about self-efficacy were added to explore in depth with PWD the behaviors associated with their diabetes.

<sup>17</sup> Percent of federal poverty level (FPL) was calculated from HHS Poverty Guidelines based on household size, income, and state of residence (AK, HI, 48 States) typically used for government programs. <http://aspe.hhs.gov/POVERTY/14poverty.cfm#thresholds>

## Knowledge of A1C

PWD commonly reported having heard the terms “A1C,” “hemoglobin A1C,” or “glycosylated hemoglobin.”

Overall, 78 percent (n=373) of PWD reported having knowledge of A1C or a related term. In 2014, the percentage was lower among Hispanic PWD, at 60 percent (n=101), than among African Americans, at 86 percent (n=172) or among Whites, at 82 percent (n=90).

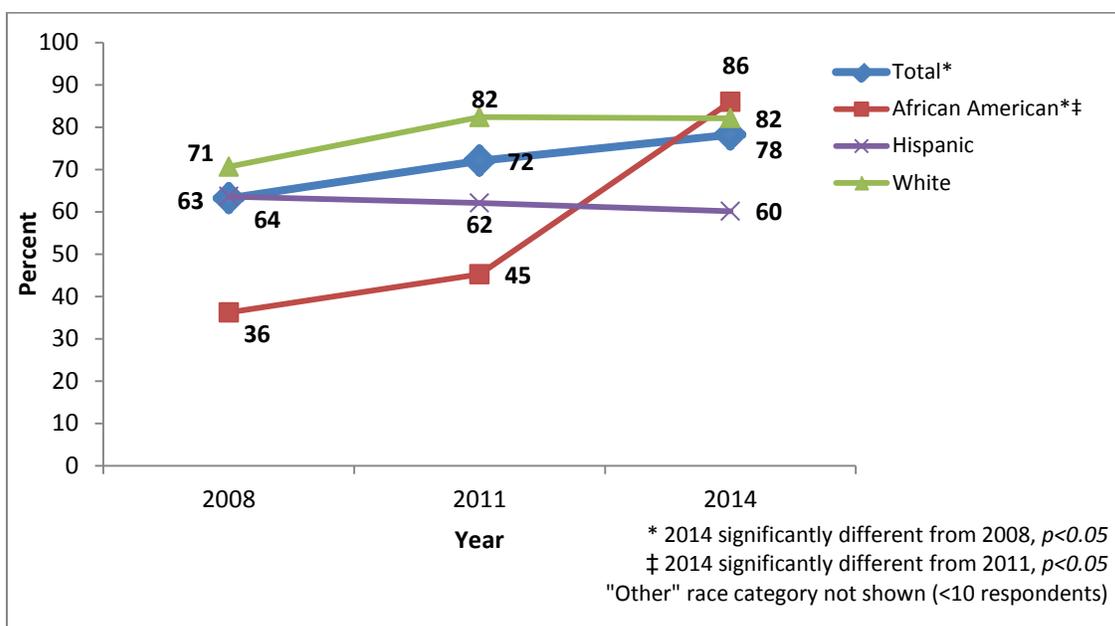
Trend data showed a significant increase overall, especially among African Americans, from 36 percent (n=38) in 2008 to 86 percent (n=172), which was not observed in the other racial/ethnic groups.

### Box 3. Relevant Survey Questions: A1C

- Have you ever heard of the term A1C, also known as glycosylated hemoglobin or hemoglobin A1C?
- In the past 12 months, how often has a doctor or other health professional checked your A1C level?

**Figure 9: Ever Heard of A1C (PWD)**

*African Americans showed significant increases in A1C awareness*



Familiarity with A1C testing increased significantly among PWD ages 65 and older, from 51 percent (n=67) in 2008 to 82 percent (n=159), but showed no significant changes for the remaining age groups.

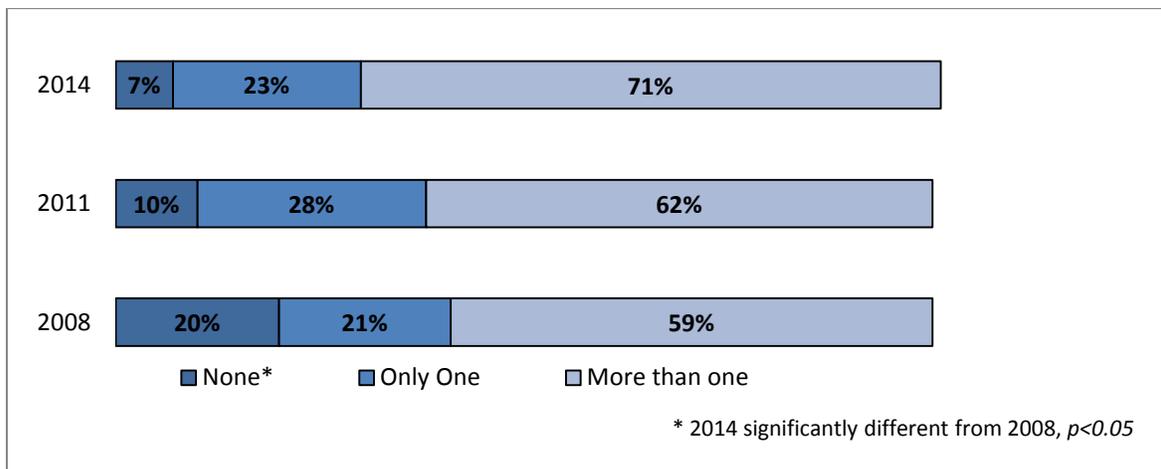
## A1C Testing Frequency in Year Prior to Survey

In the NNDS 2014, the proportion of PWD who reported having received at least one A1C test in the year prior to the survey was high, while the proportion of PWD who *did not know* whether they had the test has remained steady over the three time periods at between 9 percent and 14 percent. (The subsequent discussion excludes respondents who answered “don’t know.”)

Among those who were aware they were checked, the percentage of PWD that had their A1C levels checked more than once by a doctor or other health professional in the prior year was 71 percent (n=309). The proportion of PWD not having A1C checked at all declined significantly

overall, from 20 percent (n=101) in 2008 to 7 percent (n=32) in 2014, though numbers were small. Trends by race/ethnicity over the last three survey years were not significant

**Figure 10: Number of A1C Tests in the Past Year (PWD)**  
*Frequency of A1C tests increased significantly*



### Usual Health Care Providers (HCPs)

The NNDS 2014 included a new series of questions about whether people had someone they thought of as their usual HCP,<sup>18</sup> the type of health care provider this usual provider was, and the frequency with which they received care from this provider and other provider types.

**Box 4. Relevant Survey Questions:  
Usual HCP**

- Who do you think of as your usual health care provider?
- How often do you receive care from your usual health care provider?

Having a usual source of care was common—nearly all respondents, at 92 percent (n=2,315), indicated they thought of someone as their usual health care provider.<sup>19</sup> Of those with a usual source of care, doctors, at 84 percent (n=2,137), were the most often cited as their usual HCP. Regular care by a diabetes educator was low (7 percent) among those who sought care in addition to that from their usual health care provider.

Eight percent of respondents (n=202) reported having no usual HCP. Hispanics, at 13 percent (n=106) were significantly more likely to report *not* having a usual HCP than were Whites, at 6 percent (n=38) or African Americans, at 7 percent (n=47).

Respondents with household incomes below the FPL were more likely not to have a usual provider, at 16 percent (n=58) than those with incomes greater than 300 percent of the FPL, at 6 percent (n=56).

Many of those who named a usual health care provider received care every few months, at 46 percent (n=1,164), while 36 percent (n=736) did so once a year, and 12 percent (n=230) received care less often.

<sup>18</sup> People who reported they thought of “no one” as their usual health care provider were not asked the follow-up question about whether they regularly see other providers.

<sup>19</sup> The question response options were: Doctor, Nurse practitioner, Physician’s assistant (PA), Nurse, Other (specify), or No one.

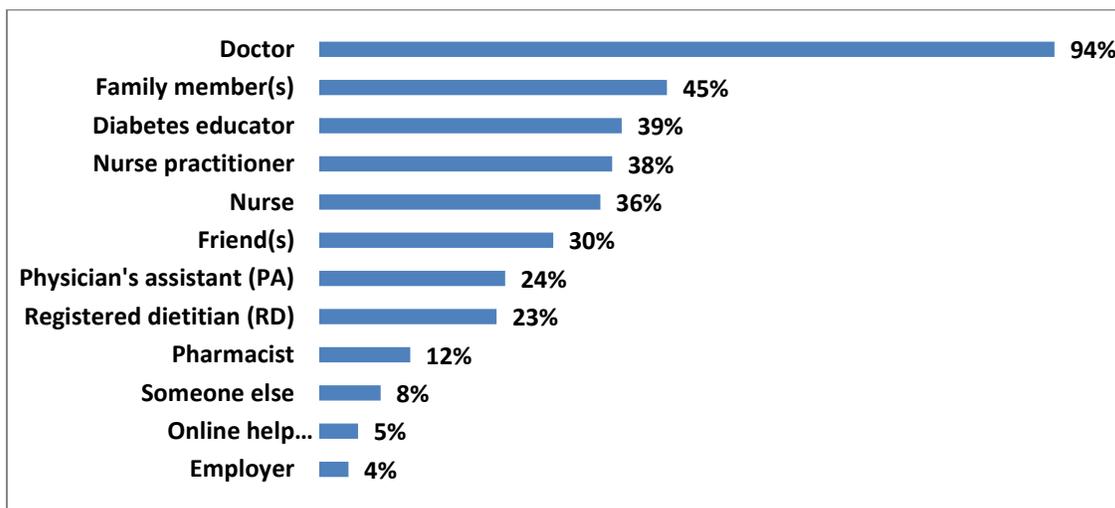
## Diabetes-Related Advice or Counseling

In 2014, the NNDS included questions related to advice and counseling for diabetes management (Figure 11 below). Receiving advice or counseling for diabetes management in the past 12 months was common among PWD, at 63 percent (n=332). The source of advice or counseling was most frequently a doctor, at 94 percent (n=312). Other types of HCPs were less commonly reported as sources, such as a nurse practitioner, at 38 percent (n=110), a nurse, at 36 percent (n=91), or a physician's assistant, at 24 percent (n=68). A family member, diabetes educator, or friend also was a relatively prominent source of advice/counseling, at 45 percent (n=125), 39 percent (n=117), and 30 percent (n=84) of PWD, respectively.

### Box 5. Relevant Survey Questions: Diabetes-related Advice or Counseling

- In the past 12 months, did anyone give you advice or counseling about how to prevent diabetes?
- In the past 12 months, who gave you advice or counseling about how to prevent diabetes?

**Figure 11: Source of Advice or Counseling for Diabetes Management (PWD): 2014**  
*Doctors and family members major source of advice/counseling*



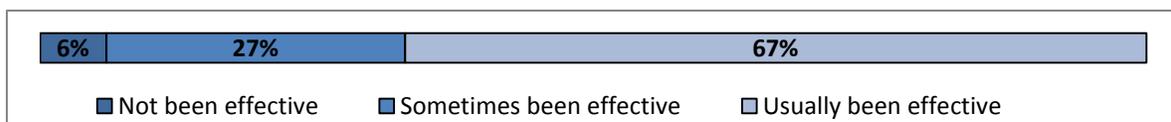
## Diabetes Self-Management and Self-Efficacy

Several NDEP diabetes campaign messages such as those found in “*Managing Diabetes. It’s not easy, but it’s worth it.*” are designed to address self-efficacy in diabetes management among PWD. New questions were added in the NNDS 2014 to ask PWD about how effective they felt their diabetes management has been, and their levels of confidence and distress in managing the disease.

### Self-management

Over two-thirds (n=297) of PWD reported that their way of managing their diabetes had “usually been effective.” On the other hand, almost one-third of PWD indicated partial or lack of effectiveness in managing their disease (27 percent (n=148) sometimes effective, and 6 percent (n=28) not effective.

**Figure 12: Self-Management of Diabetes (PWD): 2014**  
*About one-third needed more help managing their diabetes*



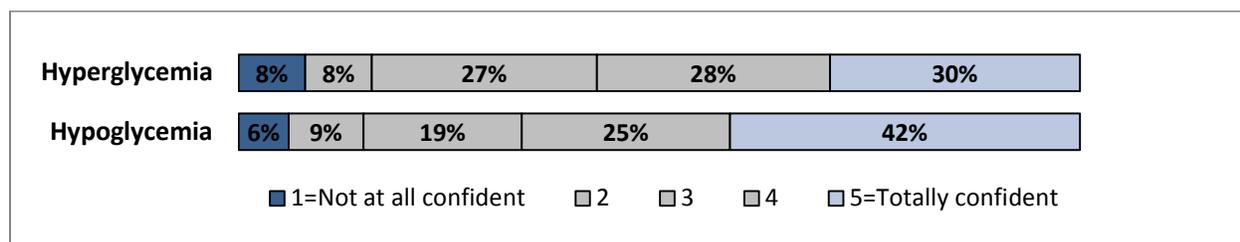
**Confidence with managing hyperglycemia/hypoglycemia**

The NNDS 2014 asked new questions to elicit a measure of PWD’s confidence in knowing what to do should they encounter issues with their blood sugar, such as spikes or drops in their desired levels. The questions were based on a 5-point scale adapted from the Lorig 8-item Diabetes Self-Efficacy Scale.<sup>20</sup> The endpoints of the scale in the survey questions were labeled as “Not at all confident” and “Totally confident.” A majority of PWD (hyperglycemia at 58 percent (n=286), and hypoglycemia at 67 percent (n=313)) reported scale values above the midpoint value of “3.” Thirty percent (n=165) of PWD expressed total confidence in their knowledge of what to do when their blood sugar went higher than it should (hyperglycemia), and 42 percent (n=209) in knowing how to handle their sugar going lower (hypoglycemia) than it should. At the other extreme of the scale, a much smaller percentage did not feel confident about what to do if their blood sugar went higher or lower than it should, at 8 percent (n=38) and 6 percent (n=32), respectively. Still, a majority of the values reported by PWD, with hyperglycemia at 63 percent (n=271) and hypoglycemia at 53 percent (n=259), also fell in the mid-range (values “2,” “3,” and “4”) between the scale endpoints. These results indicate many PWD were not really confident about knowing what to do when their blood sugar was too low or too high.

**Box 6. Relevant Survey Questions: Self-Efficacy & Diabetes Management Practices**

- In general, would you say your way of managing your diabetes has usually been effective, sometimes been effective, or not been effective?
- How confident do you feel that you know what to do when your blood sugar level goes higher than it should be (hyperglycemia) or lower than it should be (hypoglycemia)?
- In the past 4 weeks, what level of distress did you have with the following: the demands of living with diabetes; my diabetes routine; possible serious long-term complications, no matter what I do.

**Figure 13: Confidence with Managing Hyperglycemia/Hypoglycemia (PWD): 2014**  
*Confidence in knowing what to do when blood sugar was too high or too low was mixed*



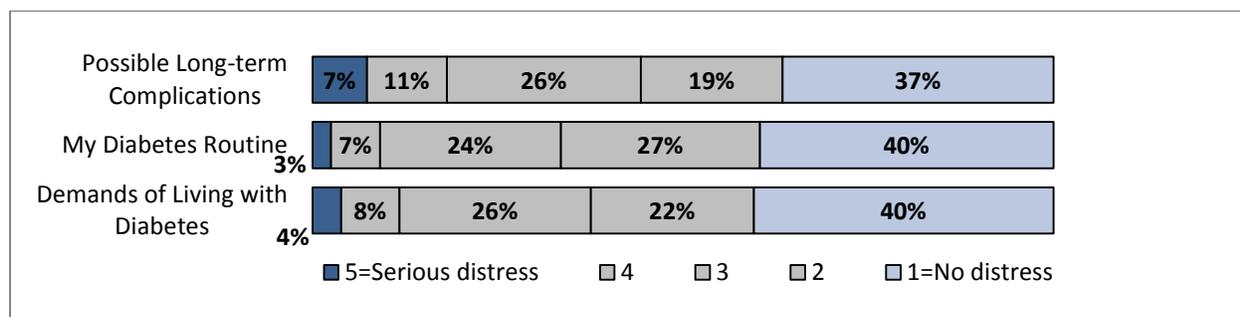
Note: Percentages may not add to 100 due to rounding.

<sup>20</sup> Diabetes Self-Efficacy Scale. 2009. Stanford Patient Education Research Center. CA: Palo Alto.

### Distress with diabetes

The 2014 NNDS also asked PWD to rate their level of distress in the past 4 weeks due to: 1) “The demands of living with diabetes,” 2) “My diabetes routine,” and 3) “Possible serious long-term complications, no matter what I do.” Respondents indicated their level of distress on a 5-point scale with the end points labeled as “No distress” and “Serious distress.” The responses indicated that, for the majority of PWD, there still was some level of distress. Reported levels of distress were similar for potential serious long-term complications associated with diabetes and with the daily diabetes routine and demands (see figure below).

**Figure 14: Reported Levels of Distress with Managing Diabetes (PWD)**  
*More than half experienced some distress with managing their diabetes*



Note: Percentages may not add to 100 due to rounding.

### Diabetes Self-Management Practices

Three questions about diabetes self-management practices have been asked in all rounds of the NNDS. These relate to respondents’ use of insulin, diabetes medication, and blood sugar testing in the past 4 weeks. The wording of the questions has changed in the 2014 survey. In 2014, the timeframe is specified as the past 4 weeks, whereas in previous surveys it was unspecified. The figure below shows the trends for PWD from 2008 to 2014. There has been a significant decline in self-testing of blood sugar from 90 percent of PWD (n=351) in 2008 to 74 percent (n=364) in 2014. This decline is not specific to any race/ethnicity or age group, and may or may not be an artifact of the change in time frame between 2014 and the previous surveys. Declines were also observed for use of insulin and diabetes medications, but these were not statistically significant.

#### Box 7. Relevant Survey Questions: Diabetes Self-Management Tools

- In the past 4 weeks, which of the following tools and resources have you used to help manage your diabetes?
- Do you use social media (e.g., Facebook, Twitter) to help you learn about or manage your diabetes?

The 2014 NNDS included three additional questions related to self-management that were not included in previous survey rounds. These related to exercise, diet, and the use of non-insulin injectable medications for diabetes in a “past 4 weeks” time period. Only 7 percent (n=40) of PWD report using non-insulin injectable medicines. By contrast, 56 percent (n=283) of PWD reported following a diabetes meal plan and 57 percent (n=265) reported exercising regularly in a “past 4 weeks” time period.

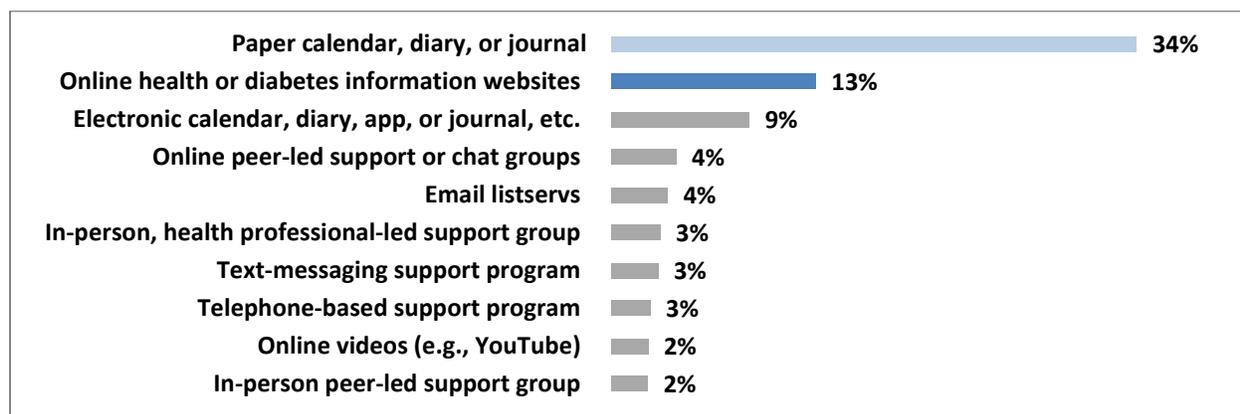
### *Self-management tools and resources*

With the expansion and proliferation of technologies for self-help and wellness, opportunities have emerged for PWD to use electronic and social media tools and resources for diabetes learning and self-management. The NNDS 2014 added questions to determine what tools—traditional and/or emerging—currently were being used by PWD. The questions also were designed to try to ascertain whether social media or new technology played a role in PWD’s diabetes management. Tools and resources surveyed included in-person support groups, online diabetes community support systems and information (e.g., videos), paper calendars/diaries/journals for tracking diabetes-related activities, and text-messaging support programs, among others.

Use of self-management tools for diabetes in the 4 weeks prior to the survey was not common among PWD (see figure below). Paper calendars, diaries, or journals to track diabetes-related activities were used by about one-third (n=173) of PWD. Online health websites were used by 13 percent (n=66) of PWD, whereas other resources and tools were used by less than 10 percent.

**Figure 15: Tools and Resources Reported Used to Help Manage Diabetes in 4 Weeks Prior to Survey (PWD): 2014**

*Traditional paper-based tools still most commonly used*



### *Social media*

Social media has become one of the new communication channels for dissemination of diabetes messages as well as possible management of diabetes. When asked about their use of social media (e.g., Facebook, Twitter) to help learn about or manage diabetes, 13 percent of PWD reported using it “often” or “only once in a while.” The majority of respondents reportedly had not used social media at all to manage their diabetes.

**Figure 16: Use of Social Media in Diabetes Management**

Use Social Media to Learn About Diabetes	N	%
Yes, I often use it to learn about or manage my diabetes	16	2
Yes, but only once in a while to learn about or manage my diabetes	46	11
No, I never use it to learn about or manage my diabetes	415	87

## 6. Perceived Risk

Past NNDS surveys measured personal risk perceptions by asking people who had not been diagnosed with diabetes (non-PWD) whether they felt they could be at risk for diabetes or prediabetes. The NNDS 2014 modified the question wording to specify type 2 diabetes, and eliminated the mention of prediabetes to avoid confusion.

### Overall perceptions of risk

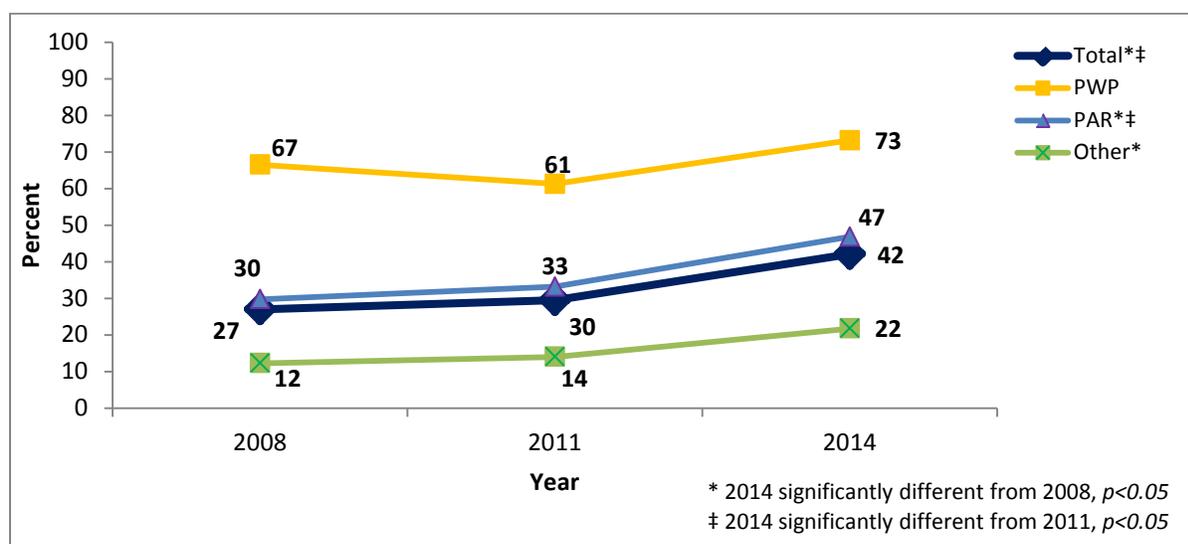
Results from previous NNDS showed no significant trends from 2008 to 2011 for the overall population or by diabetes status subgroups. The stagnant trend over that period has taken a significant upward turn overall, with 42 percent of people not diagnosed with diabetes (non-PWD) reporting, in 2014, that they felt they had a chance of getting type 2 diabetes.

Increases were observed among all the diabetes status subgroups. Levels for PWP remained high, although they were relatively unchanged over the 6-year period since 2008. Of particular note is that reported risk among PAR changed significantly over time—from 30 percent (n=276) in 2008 and 33 percent (n=252) in 2011 to 47 percent (n=481) in 2014.

#### Box 8. Relevant Survey Questions: Perceived Risk

- Do you feel you have a chance of getting type 2 diabetes?
- How high or low do you think your chance of getting diabetes: very high, somewhat high, somewhat low, or very low?
- I think I have a chance of getting type 2 diabetes because of my: family's history of diabetes, weight, age, race/ethnicity, level of physical activity/exercise, health, history of gestational diabetes/diabetes during my pregnancy (*female only*), other reason.

**Figure 17: Feel at Risk of Diabetes (non-PWD)**  
*Some significant increases found in perceived personal risk*



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## Degree of Risk

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As a follow-up question for those non-PWD who felt they had a chance of getting diabetes, people were asked in the NNDS 2014 to report the degree with which they felt at risk.

When people were asked to select a category ranging from very high to very low risk, most people, at 89 percent (n=772), indicated their risk was in the middle range—either somewhat high or somewhat low—with very few selecting the categories at the extremes. However, almost half of people, at 47 percent (n=433), reported their risk to be somewhat high or very high when taken together.

There were no statistically significant differences by age group in the degree of risk.

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## Reasons for Perceived Chance of Getting Diabetes, and Whether It Can Be Reduced

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In the NNDS 2014, the question about reasons for perceived chance of getting diabetes was modified from the 2011 open-ended version to one that included pre-coded response categories based on those that had been spontaneously mentioned in prior surveys. The question also dropped the reference to prediabetes and specified type 2 diabetes.

Previous NNDS for adults ages 45 and older showed few significant trends in the reasons people with diabetes risk factors gave for why they felt at risk for diabetes. The reason mentioned most often was family history.

In 2014, respondents who indicated that they felt at risk of diabetes were asked to select from eight reasons why they felt at risk: family history, weight, age, race/ethnicity, level of physical activity/exercise, health, gestational diabetes (females), and other. Respondents were able to select more than one possible reason. The most commonly cited reasons were weight, at 70 percent (n=555); level of physical activity/exercise, at 55 percent (n=439); and family history, at 52 percent (n=485).

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## 7. Diabetes Preventive Behaviors

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The NDEP has launched several waves of campaigns and developed messages and materials around diabetes prevention since 2003. Since that time, the NNDS has shown significant gains in knowledge that type 2 diabetes can be prevented or delayed and an awareness of the term *prediabetes* (Griffey et al., 2015). The NNDS 2014 took a step further toward asking more detailed questions about the type and content of any diabetes prevention information the general public was receiving, from whom, and what actions they might have been taking in response to this information.

## Advice or Counseling to Prevent or Delay Diabetes

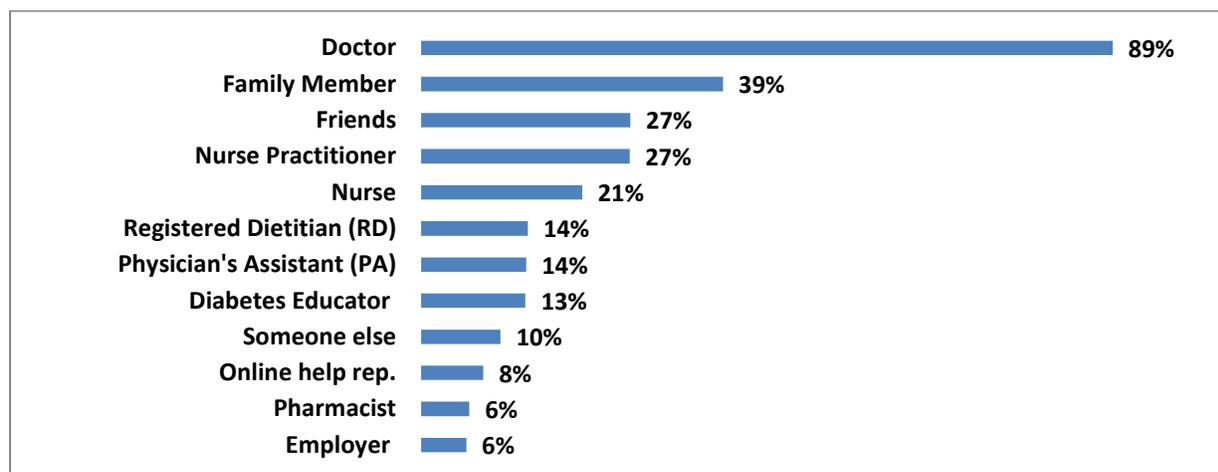
The NNDS 2014 asked people who had not been diagnosed with diabetes (non-PWD) if they had received counseling in the past 12 months about how to prevent diabetes. Among adults ages 35 and older, diabetes prevention advice/counseling for non-PWD was not commonly reported, at 15 percent (n=430).

The main sources of diabetes advice/counseling among non-PWD tended to be doctors or family members, at 89 percent (n=352) and 39 percent (n=161), respectively.

### Box 9. Relevant Survey Questions: Diabetes Preventive Behaviors

- In the past 12 months, who gave you advice or counseling about how to prevent diabetes?
- Did you receive advice and counseling to control your weight or lose weight, reduce calories and/or portion sizes in your diet, increase your physical activity or exercise, and/or take medicines?

**Figure 18: Source of Advice or Counseling About How to Prevent Diabetes, 2014 (non-PWD)**  
*Doctors and family members major source of advice/counseling*



### Type of advice

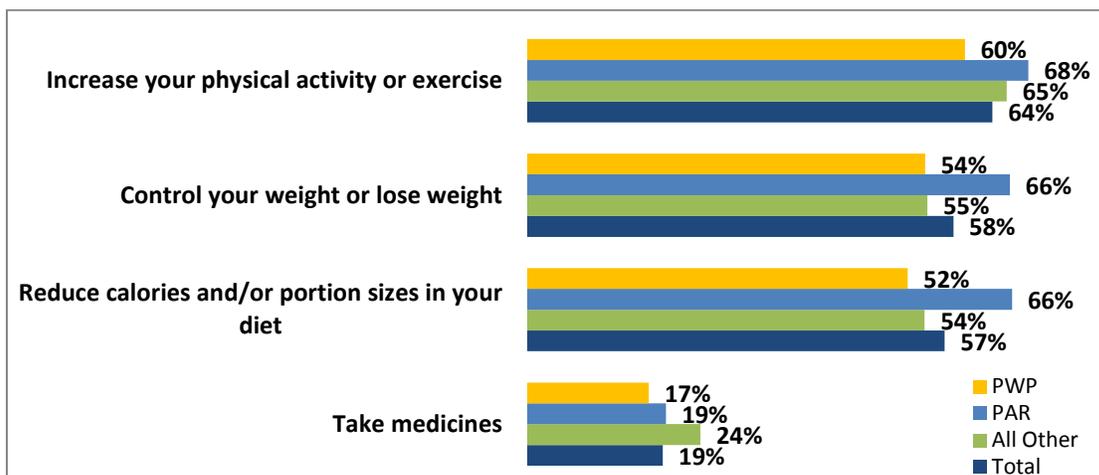
In the NNDS 2014, non-PWD who reported having received counseling or advice in the past 12 months were asked whether the advice/counseling included four specific recommendations:

- To control or lose weight
- To reduce calories/portion sizes
- To increase activity/exercise
- To take medications

Among all non-PWD reporting receiving advice or counseling, similar proportions of respondents received advice to control or lose weight as did to reduce calories or increase physical activity/exercise; 58 percent (n=268), 57 percent (n=269), and 64 percent (n=286), respectively. However, it was much less common, at 19 percent (n=84), for non-PWD to receive advice on taking medicines in relation to diabetes prevention. For 2014, no statistically

significant differences were observed between the type of advice/counseling provided to PWP, PAR, and All Others.

**Figure 19: Type of Advice or Counseling Received, by Diabetes Status (2014)**



### Preventive actions by respondent

In the NNDS 2014, people who had not been diagnosed with diabetes were asked if they had taken action in the past 12 months to reduce their risk of developing diabetes. Roughly half of non-PWD, at 51 percent (n=1,145), reported that they had taken action. PWP were significantly more likely to report having taken action than PAR or All Others, at 79 percent (n=266), 47 percent (n=577), and 44 percent (n=302), respectively.

Those who reported taking action were asked whether their activities included nine types of activities. Among non-PWD, activities related to weight, diet, and walking/exercise were the three most commonly reported. Planning to have bariatric surgery as a diabetes prevention strategy was rare among non-PWD in the NNDS 2014: among PWP at 2 percent (n=6), PAR at 2 percent (n=10) and All Others at less than 1 percent (n=4). Significant differences among respondents by diabetes status were found for exercise-related activities.<sup>21</sup> For these activities, PWP and PAR were significantly less likely than All Others (i.e., all non-PWD who were not already classified as PWP or PAR; not shown in graph below) to report doing prevention activities such as increasing exercise and light/moderate activities.

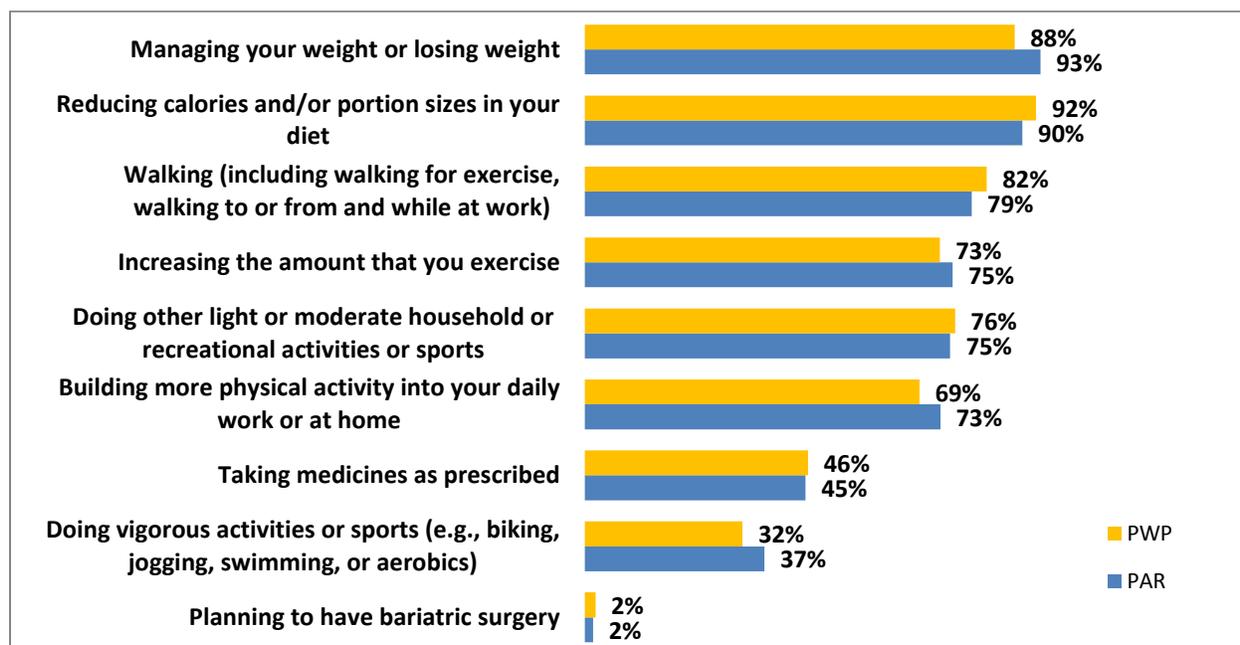
#### Box 10. Relevant Survey Questions: Diabetes Preventive Behaviors

- In the past 12 months, what have you been doing (if anything) to reduce your chance of getting diabetes?
- In the past 12 months, which types of classes, programs, coaching, or counseling sessions to help you prevent or delay your chance of getting diabetes and its complications did you attend?
- Who provided the classes, programs, coaching, or counseling sessions?
- In the next 6 months, how likely are you to become more active to reduce your chance of getting diabetes?
- Why are you not likely to do something to reduce your chance of getting diabetes?
- In the past 12 months, has anyone encouraged you to attend any programs or classes or change your lifestyle to help you prevent diabetes?

<sup>21</sup> "Increasing the amount that you exercise," "Doing other light or moderate household (e.g., chores, gardening) or recreational activities or sports (e.g., bowling, yoga)," and "Doing vigorous activities or sports (e.g., biking, jogging, swimming, or aerobics)."

**Figure 20: Diabetes Prevention Activities (PWP and PAR)**

*Weight control and diet top the list*



#### *Types of education/classes*

In the NNDS 2014, people not diagnosed with diabetes were asked whether they, in the prior 12 months, had attended any classes, programs, or coaching/counseling sessions to help prevent or delay diabetes and its complications. About 3 percent (n=91) reported they attended classes, etc. Among those who had participated, people stated that the programs, classes, or counseling included:

- Advice related to nutrition: 85 percent (n=75)
- Exercise: 72 percent (n=64)
- Weight loss: 60 percent (n=53)
- Health and wellness: 60 percent (n=62)
- Stress management: 45 percent (n=35)
- Smoking cessation: 24 percent (n=20)

#### *Who provided education/classes*

Among those who said they attended classes, programs, or coaching/counseling sessions, respondents were most likely to report in the NNDS 2014 that these were provided by their doctor or other HCP, at 58 percent (n=56). Though numbers were small, the next most common mentions were:

- Their health insurance plan: 42 percent (n=44)
- The local community: 36 percent (n=38)
- Private business: 25 percent (n=13)
- Their employer: 24 percent (n=22)

### *Likelihood for taking more action, or reasons for not taking action*

In 2014, about one-third (n=1,541) of non-PWD reported that they were “Somewhat Likely” or “Very Likely” to become more active in the next 6 months to reduce their chance of getting diabetes.

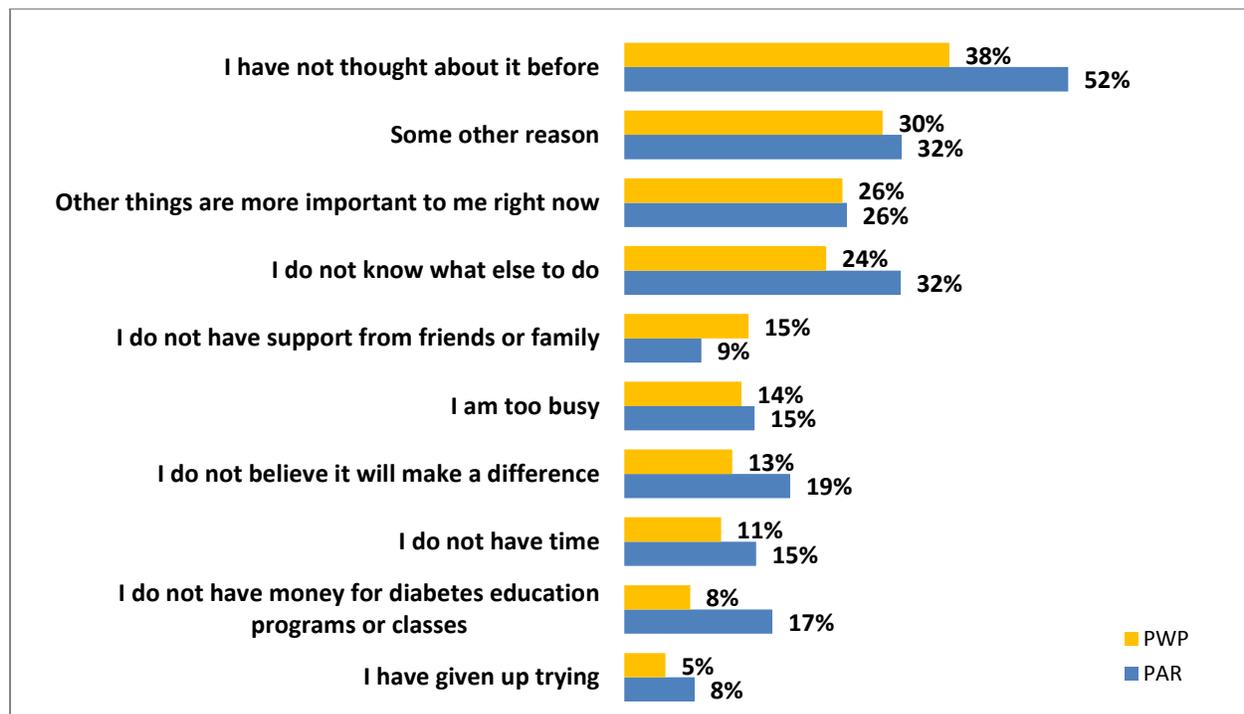
Non-PWD who reported they were not likely to take action to prevent diabetes were asked to select from a list of 10 possible reasons. The most common among these were:

- “I have not thought about it before”: 43 percent (n=289)
- “I do not know what else to do”: 29 percent (n=185)
- “Other things are more important to me right now”: 23 percent (n=129)

These three reasons were similarly mentioned by PAR and PWP as well as All Others.

**Figure 21: Reasons People Not Diagnosed with Diabetes Are Not Taking Action to Prevent/Delay Diabetes (2014)**

*Non-PWD most commonly report not thinking about taking action to prevent/delay diabetes*



### *Sources of encouragement*

In the NNDS 2014, 15 percent (n=410) of non-PWD reported they had been encouraged to attend programs or classes or to change their lifestyle to prevent diabetes. The figure below presents the sources of encouragement. Encouragement was most likely to come from one’s doctor or from family members, at 63 percent (n=245) and 60 percent (n=234), respectively. PWP were significantly more likely, at 85 percent (n=109), to report encouragement coming from a doctor than were PAR, at 54 percent (n=107) and All Others, at 39 percent (n=29). No other significant differences were observed.

**Figure 22: Source of Encouragement for Diabetes Prevention (2014): Percent**

Source of Encouragement	Total	PWP	PAR	All Others
Doctor	63	85 *	54	39
Diabetes Educator	5	7	4	9
Registered Dietitian	11	14	8	14
Other Health Professional	21	26	21	10
Family	60	56	63	62
Friends	33	28	32	51
Employer	9	9	10	5
Someone Else	9	7	9	12

\* Significantly different from PAR and All Others,  $p < 0.05$ .

## 8. Results Summary

### Highlights

The NNDS 2014, together with previous rounds of the survey, offer several interesting results with potential implications for the NDEP. Key findings include:

#### Overall—

- Awareness of the link between diabetes and heart disease remains low***  
 Among all groups, and particularly among Hispanics and adults over age 65, a large proportion of respondents do not appear to recognize that CVD outcomes can be caused by diabetes. “Amputation, loss of foot or leg,” “Blindness,” and “Death” continue to be more commonly associated with diabetes than CVD.
- Awareness of a family history of diabetes has risen***  
 The proportion of people reporting a family history of diabetes in 2014 increased significantly from 2008. Between 2008 and 2014, we observed PWD were significantly more likely to report having family members with diabetes. Over the same period, there were significant increases among African Americans and Hispanics. The rise from 2008 to 2014 among the African American and Hispanic racial/ethnic groups was consistent with increased education efforts by NDEP and its partners since 2008 that were put into action in response to results obtained from an earlier NNDS.
- Doctors continue to play a role in lowering disease risk; family and friend networks also appear to play a large role in providing advice or counseling on diabetes prevention and management***  
 Doctors are the most-cited source of diabetes prevention, management counseling, and advice. They also are the most frequently cited sources of encouragement for participating in courses or programs for lifestyle changes to prevent, delay, or manage diabetes. Family and friends are also commonly cited. While doctors, family, and friends are well positioned to offer advice and counseling, their prominence as sources of diabetes prevention and management information may reflect the high value that people place on their advice.

- **Regular care by a diabetes educator is low**
  - A large proportion (about 90 percent) of PWD and people not diagnosed with diabetes (non-PWD) received advice and counseling from their doctor, compared to 39 percent of PWD and 13 percent of non-PWD who received advice/counseling from a diabetes educator in the year prior to the survey. Among those who sought care in addition to that from their usual health care provider, regular care by a diabetes educator was low (7 percent).
  
- **Health care coverage was high, but knowledge of health/wellness program coverage was low**

The majority of people reported having health insurance or health care coverage for all or part of their medical care. However, about 40 percent of those with coverage *did not know* whether their coverage included any weight loss, exercise, or other health or wellness programs.

**Among people with diabetes (PWD)—**

- **Some diabetes self-management practices appear to be declining**

Practices associated with diabetes self-management such as A1C testing, testing of blood sugar (e.g., glycemic monitoring of blood glucose), and others exhibited a mix of trends. While A1C testing was increasingly common among PWD, some reported diabetes self-management practices such as checking one's own blood sugar decreased significantly. In addition, in 2014 a large proportion of PWD reportedly were not totally confident in knowing what to do when their blood sugar was too high or too low.
  
- **Confidence and distress related to managing their diabetes was still an issue for PWD**

Among PWD, confidence in managing diabetes-related changes in blood sugar (hyper- or hypoglycemia) was moderate. Regarding levels of distress with their daily routine, the demands of living with diabetes, and possible long-term complications, reports by PWD showed similar patterns of levels of distress. Overall, more than half of PWD reported for each issue levels of distress within the medium range (scale values 2, 3, and 4).
  
- **Social media tools are not widely used for diabetes management**

Traditional methods such as paper calendars were more popular for diabetes management (used by about one-third of PWD) than social media or other online tools and resources.
  
- **Frequency and awareness of A1C testing among PWD has improved**

The majority of PWD reported high levels of awareness of A1C, with highest levels and significant increases over time among African Americans. PWD also showed gains in testing, with a significant decline from 2008 to 2014 in the proportion of PWD who did not receive an A1C test in the prior year. Though the trend was not significant, over the three survey years the majority of PWD indicated that they obtained an A1C test more than once in the prior year, a finding that is consistent with the A1C guidelines (at least

two or more tests per year).<sup>22</sup> Trends over the last three survey years also showed most PWD in the racial/ethnic subgroups had more than one A1C test per year; however, changes over time were not significant for African Americans and Hispanics.

**Among PWP and PAR—**

- ***Diabetes prevention awareness remains high***

Awareness that diabetes can be prevented is high overall; however, levels among African Americans and Hispanics tend to be lower than Whites.

- ***Continued lack of acknowledgement of their risk among many at risk***

Nearly half of those at risk report they do not feel at risk of type 2 diabetes. Among those at risk who did not feel they had a chance of getting diabetes, most (85 percent) did not receive diabetes prevention counseling or advice in the previous year.

- ***Many people at greatest risk were taking some action to prevent diabetes, but there is room for improvement***

PWP were significantly more likely to report taking action than PAR. While over half (54 percent) of non-PWD (PWP and PAR) reported taking action to prevent diabetes, this meant that nearly half of this population was not taking action. In addition, almost half mentioned that they had not thought about taking action before.

- ***Having a known diagnosis of prediabetes may influence behaviors***

PWP (79 percent) were significantly more likely to report having taken action to prevent diabetes than other non-PWD (PAR, 47 percent; All Others, 44 percent). The results suggest having a known diagnosis of prediabetes or other at-risk diagnosis such as “impaired fasting glucose” or “glucose intolerance” may affect behaviors around diabetes prevention among PWP and/or their HCPs.

## Limitations

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A few potential limitations should be kept in mind when interpreting the survey results:

- Because the data are self-reported, they may at times reflect personal influences and subjective information.
- In addition to sampling error, other factors may have introduced error or bias into the findings such as the way questions were worded or the practicalities of administering the surveys.
- Not all of the differences found across the surveys were statistically significant. This was sometimes due to small cell sizes and their associated large standard errors, particularly when data were tabulated by subgroup (e.g., race/ethnicity, age group, or diabetes status).
- Changes in survey administration mode (i.e., from telephone to web survey) do not appear to have affected data trends, but may have had some unobserved effects.

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<sup>22</sup> American Diabetes Association. ADA 2014 guidelines: frequency of A1C testing. *Diabetes Care* 37(suppl. 1): S14-S80.

## 9. Potential Program Implications

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The NDEP's conduct of the NNDS over the last several years has provided the Program and its 200-plus partner organizations across the nation with evidence-based and usable information on the U.S. adult public's perspectives and practices regarding diabetes. The Program's education efforts apply this information for prevention of type 2 diabetes and better diabetes management and control. The findings presented in this report from three NNDS surveys (2008, 2011, and 2014) of adults 35 years of age and older help demonstrate the continued success and effectiveness of the NDEP and its partners.

In 2014, several questions were added to provide the Program with more data, including on preventive actions taken, the source of care and advice/counseling to prevent diabetes, and access to health care and understanding of people's health insurance coverage. These among other new questions should prove vital to highlight opportunities and possible next steps for the NDEP.

Synthesis of key results has generated a list of potential implications for the NDEP:

- **Continued need to address the link between diabetes and cardiovascular disease (CVD)**  
More than half of people did not connect CVD-related problems such as heart disease, heart condition, heart attack, or stroke as a serious health problem associated with diabetes. The link between CVD and diabetes should be addressed early on in the progress of the disease, particularly among Hispanics who were less likely to perceive the seriousness of CVD and its connection with diabetes. Health providers and diabetes educators can help educate people about the steps they can take to lower their CVD risk associated with diabetes.
- **Disseminate messages to health care providers (HCPs) about diabetes education and improving outcomes**  
Doctors and primary HCPs are well-positioned to include diabetes prevention and management messages as part of their regular care. Doctors along with family and friends reportedly played a central role in providing advice/counseling on the prevention and control of diabetes, and this role increased significantly since 2008.  
  
Encourage doctors and diabetes educators to work together in primary care settings, and encourage doctors to refer patients to diabetes educators and community programs. Further engagement with HCPs should help improve education, awareness, and prevention for all diabetes status populations.
- **Increase support for family interventions**  
Although doctors were identified as the primary source of advice/counseling, family and friends were also very important. Engage family members with messages about their crucial role in addressing the psychosocial barriers and challenges associated with managing their loved one's disease.

Diabetes education messages should also help empower family members of PWD to get screened for diabetes and encourage family-based interventions for healthy lifestyles and diets to prevent and delay diabetes onset.

- **Use NNDS information to focus and refresh NDEP campaigns**  
NNDS findings on diabetes self-management and education can be used to focus and refresh the campaign *Managing Your Diabetes Is Not Easy, But It's Worth It*. This campaign was first developed to address self-efficacy messages to communicate the seriousness of diabetes and its complications, and to promote the importance of making a plan of action. The NDEP also administers other targeted campaigns, such as the *Be Smart About Your Heart* and the *Know Your Family Health History* campaigns, that can be leveraged to respond to NNDS findings. The 2014 NNDS results point to the need for more messaging about hypoglycemia and hyperglycemia as well as coping with the demands of diabetes.

- **Promote confidence-building and support for diabetes management**  
Related to the implication above, moderate levels of confidence among those dealing with diabetes on a daily basis underscore the need for continued support to further increase confidence in managing diabetes. Attention should be focused on increasing confidence in management of hypo- and hyperglycemia. Issues surrounding diabetes distress could be addressed through provision of coping and psychosocial/emotional support.

Given that nearly half of respondents with diabetes were still not fully confident in knowing what to do when their blood sugar was too high or too low, and that they were experiencing some level of distress in managing their diabetes, leveraging resources for their diabetes management may be crucial.

- **Focus on health insurance and health care coverage education**  
Because almost half of respondents (40 percent) indicated they did not know whether their health insurance coverage included diabetes preventive activities and resources, there is a need to encourage people to ask about and understand what diabetes-related services and care are covered as part of their health insurance. Educate people about ways to overcome barriers and issues related to access to health care coverage. Help those without coverage find resources in their community to manage their diabetes.
- **Glycemic monitoring and control—focus on self-management and checking blood sugar**  
More PWD know about A1C and have shown improvement in getting the recommended frequency of A1C tests, but they are checking their own blood sugar less often. Educators have an opportunity here to help their clients learn the value of monitoring their blood sugar and how to use the results for management of their diabetes.
- **Focus on increasing screening, early diagnosis, and intervention for prediabetes/diabetes**

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Encourage primary HCPs to focus attention on screening for those at risk of diabetes and prediabetes so that, if risk factors are present, an early diagnosis can be made and communicated to the patient. Primary HCPs should be prepared to help patients with prediabetes initiate lifestyle changes for type 2 diabetes prevention. They should refer patients with newly diagnosed diabetes for diabetes education.

- **Continue to engage with NDEP partners**

Changes cannot be made in a vacuum. The NDEP recognizes the value of its partnership with member organizations and the important input and collaboration they bring to the table. NDEP will continue to work with partner organizations to promote and disseminate NDEP messages.

The survey findings contribute to the improvements in diabetes prevention and management by the NDEP and its partners as well as meeting the challenges that remain ahead.

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## Appendices

- Appendix A. NNDS 2014 Sampling and Weighting Methodology
- Appendix B. Demographic Characteristics and Diabetes Status, Ages 35+ (2014, 2011, 2008)
- Appendix C. NNDS 2014 Questionnaire (Word document version)
- Appendix D. Data Tables for Figures