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Self-reported Prevalence of Diabetes Screening in the U.S., 2005–2010

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Abstract

Background—Early detection of type 2 diabetes has the potential to prevent complications but the prevalence of opportunistic screening is unknown.

Purpose—To describe the prevalence of diabetes screening by demographic and diabetes-related factors and to determine predictors of screening among a representative U.S. population without self-reported diabetes.

Methods—Cross-sectional data were obtained from the 2005–2010 National Health and Nutrition Examination Survey (n=15,125) and 2006 National Health Interview Survey (n=21,519). Participants were aged ≥20 years and self-reported having a diabetes screening test in the past 3 years. Diabetes screening prevalence was analyzed according to risk factors recommended by the American Diabetes Association. Logistic regression was used to determine significant predictors of diabetes screening. Analysis was conducted in 2012–2013

Results—The prevalence of having a blood test for diabetes in the past 3 years was 42.1% in 2005–2006, 41.6% in 2007–2008, and 46.8% in 2009–2010. This prevalence increased with age and was higher for women, non-Hispanic whites, and those with more education and income (p<0.001 for all). Body mass index ≥25 kg/m^2, age ≥45 years, having a relative with diabetes, hypertension, glycosylated hemoglobin ≥5.7%, and cardiovascular disease history were significant predictors of screening. For each additional risk factor, the likelihood of screening increased by 51%.

Conclusions—Nearly half of the adult population reported having a diabetes screening test. However, testing was less prevalent in minorities and those with lower socioeconomic status. Public health efforts to address these deficiencies in screening are needed.

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Introduction

Type 2 diabetes mellitus (T2DM) has exhibited an alarming increase in its prevalence in the adult population, fueled by increases in obesity in recent years.[1] This increase is of major public health concern, given that T2DM is now a major contributor to cardiovascular disease (CVD) mortality[2, 3] while elevated plasma glucose and glycosylated hemoglobin (HbA1c) are risk factors for CVD.[4–6] Thus, early identification and treatment of individuals with unknown T2DM offers the potential of at least reducing the risk of early death. To date, however, there is no long-term randomized trial demonstrating the efficacy of public screening for T2DM or for its cost-effectiveness. Opportunistic screening nonetheless is undertaken in physicians' offices and other healthcare venues, but the prevalence of screening is unknown.

The purpose of this report is to present the national prevalence and describe the demographic and phenotypic characteristics of individuals acknowledging that they had a test for diabetes within the preceding 3 years. These prevalence measures are also analyzed according to guidelines for screening promulgated by the American Diabetes Association (ADA).[7] The ADA recommends that overweight adults who have one or more additional risk factors be screened for diabetes; in addition, all adults aged ≥45 years should be screened every 3 years.[7] Additional risk factors include physical inactivity, belonging to a high-risk race/ethnicity, having a first-degree relative with diabetes, history of gestational diabetes or prediabetes, hypertension, low high-density lipoprotein (HDL) cholesterol or high triglycerides, CVD, other clinical conditions associated with insulin resistance (including severe obesity), or polycystic ovary syndrome among women. The results of this study should inform health researchers and practitioners about disparities in screening and whether high-risk individuals are being targeted.

Methods

The National Health and Nutrition Examination Survey (NHANES) is a stratified multistage probability survey conducted in the non-institutionalized civilian U.S. population and includes both a household interview and physical examination.[8] The National Health Interview Survey (NHIS) is a cross-sectional household interview survey that utilizes a multistage probability design among the non-institutionalized civilian U.S. population.[9] The sample included 15,125 adults aged ≥20 years from NHANES 2005–2010 and 21,519 adults from NHIS 2006 who reported no previous diagnosis of diabetes.

Measures

In both surveys, demographic characteristics were self-reported, including age, sex, race/ethnicity, education, and family income. In addition, participants self-reported health insurance coverage, a diagnosis of prediabetes, the number of times they saw any physician or healthcare professional in the past year (NHANES), or whether they saw a general doctor who treats a variety of illnesses in the past year (NHIS).

Additional data from NHANES included self-reported information on having a first-degree relative with diabetes (parent or sibling), taking medication for hypertension, and history of

CVD (congestive heart failure, coronary heart disease, angina, or heart attack). Physical inactivity was determined by several questionnaire items that assessed exercise related to usual transportation mode, work-related activity, or recreational exercise.[8] Women self-reported a history of gestational diabetes or having delivered a baby >9 pounds

In NHANES 2005–2010, participants were asked whether they had a blood test for high blood sugar or diabetes in the past 3 years. In NHIS 2006, participants were asked whether they had such a fasting blood test. Participants who answered *yes* to these questions were classified as having a diabetes screening test.

In NHANES, BMI (kg/m^2) was determined from height and weight. Blood pressure was measured using a standardized mercury sphygmomanometer after the participant rested quietly for 5 minutes.[10] Hypertension was defined as self-reported medication use for high blood pressure or having a blood pressure ≥140/80 mmHg. Triglycerides and glucose were only measured for persons who had fasted 8–<24 hours (n=6,113). HbA1c and HDL were measured for all participants

Statistical Analysis

Descriptive statistics were used to characterize the study populations and report the prevalence of having a screening test for diabetes by demographic characteristics and diabetes-related factors. Using examination data from NHANES, the prevalence of having a screening test was determined, stratified by the ADA screening recommendations and by multiple risk factors for diabetes

Multivariable logistic regression (ORs, 95% CIs) was used to determine the association between ADA screening criteria and having a screening test. The initial full model for all adults included the following covariates: BMI ≥25, age ≥45 years, sedentary, relative with diabetes, non-Hispanic black or Hispanic ethnicity (versus non-Hispanic white), hypertension, HDL <35 mg/dL, HbA1c ≥5.7%, and history of CVD. For women, the full initial model also included history of gestational diabetes. A backwards elimination process was used to determine a parsimonious model by removing covariates in a step-wise manner if they were statistically non-significant (p>0.05).

To assess the effects of having multiple risk factors for screening, a continuous variable was created for the number of risk factors using the variables included in the final model. A continuous variable was deemed appropriate based on preliminary analyses finding a linear incremental increase in the odds of screening using dummy variables for each risk factor. The odds of screening for each additional screening criterion were determined using logistic regression.

Since triglycerides were only measured in the fasting sample and thus reduced the sample size, they were not included as a variable in the original model. Additional regression models for all adults, women, and men were analyzed for only the fasting sample and included triglycerides.

All analyses used sample weights and accounted for the cluster design. Analysis was conducted using SUDAAN, Release 11 (RTI International, Research Triangle Park NC) and were conducted in 2012–2013.

Results

As expected based on the similar time frame and sampling strategy, the characteristics of the NHANES 2005–2010 and NHIS 2006 study populations were similar (Table 1). The only exception was that more participants in NHIS 2006 reported not having seen a doctor in the past year compared to NHANES 2005–2010 participants.

Overall, the prevalence of having had a blood test to screen for diabetes in the past 3 years was 43.6% in NHANES with an increase in screening between 2005–2006 (42.1%) and 2009–2010 (46.8%) (Table 2). The prevalence of having a blood test increased with age and was lower in men (37.9%) than women (48.7%); Hispanics (38.9%) or Mexican Americans (38.6%) than non- Hispanic whites (44.5%) or non-Hispanic blacks (46.3%); those with less than a high school education (40.5%) compared with college graduates (46.6%); and in adults with a family income <$20,000 (39.2%) compared with ≥$75,000 (47.1%) ($p<0.001$ for all). Adults without health insurance, without self-reported prediabetes, and those who did not see any type of doctor in the past year were less likely to have a diabetes screening test compared to their respective counterparts ($p<0.001$ for all).

For all demographic and diabetes-related factors, the prevalence of having a fasting blood test to screen for diabetes in the NHIS was 30.3%, lower than having any type of blood test to screen for diabetes in the NHANES (Table 2). The results by study characteristics in NHIS were similar to those in NHANES.

The prevalence of the ADA screening criteria for diabetes is shown in the left column of Table 3. Among adults without a previous diagnosis of diabetes, the prevalence of overweight was 66.4% and about half were aged ≥45 years. About one quarter were both overweight and had a first-degree relative with diabetes or were both overweight and had hypertension. Just over half were overweight and had elevated glucose. The prevalence of overweight adults who were aged ≥45 years was 34.6%.

The prevalence of having a screening test for diabetes according to the ADA criteria is shown in the right column of Table 3. The prevalence of having a screening test for diabetes among those who were overweight was 47.7%. Among overweight adults, the prevalence of having a screening test ranged from 41.2% among Mexican Americans to 65.5% among those with a history of CVD. More than 50% of overweight participants had been screened if they were physically inactive, had a first degree relative with diabetes, were non-Hispanic black, had a history of gestational diabetes or CVD, were hypertensive, or had elevated glucose or a BMI ≥40 kg/m^2. The prevalence of screening increased with additional screening criteria. Among all adults aged ≥45 years, 53.2% had a blood test to screen for diabetes; the prevalence for adults aged ≥45 years who were also overweight was 56.9%.

For all adults, the final model included age, hypertension, having a relative with diabetes, being overweight, HbA1c ≥5.7%, and a history of CVD (Table 4). Results from logistic

regression showed that the highest odds for having a blood test to screen for diabetes were for those aged ≥45 years (OR=1.68) followed by having hypertension (1.67), a relative with diabetes (1.54), being overweight (1.40), having HbA1c ≥5.7% (1.28), and a history of CVD (1.23). The odds of having a diabetes screening test was increased by 51% for the presence of each additional one of these risk factors for screening (OR=1.51, 95% CI=1.45, 1.57).

For women, the final model included age, hypertension, having a relative with diabetes, being overweight, HbA1c ≥5.7%, and a history of gestational diabetes. Regression results for women were similar to the results for all adults except that having a history of CVD was not a significant predictor but a previous diagnosis of gestational diabetes was a significant predictor of diabetes screening (OR=1.31, 95% CI=1.04, 1.64) (data not shown). The ORs for women ranged from 1.21 (age ≥45 years, 95% CI=1.04, 1.40) to 1.67 (hypertension, 95% CI=1.37, 2.04).

For men, the final model included age, hypertension, having a relative with diabetes, HbA1c ≥5.7%, history of CVD, and race/ethnicity. Regression results for men were also similar to those of all adults except that BMI was marginally significant (p=0.052) in increasing the odds of having a screening test. In addition, Hispanic ethnicity was associated with a significant decrease in the odds of having a screening test (versus non-Hispanic white men, OR=0.83, 95% CI=0.72, 0.97). All other predictors significantly increased the likelihood of being screened (OR range=1.28 to 2.42) (data not shown).

Triglycerides were not significant predictors of diabetes screening for all adults or men. However, high triglyceride levels were significantly associated with having a screening test among women (OR=1.75, 95% CI=1.13, 2.72) (data not shown).

Discussion

The increasing prevalence of T2DM and the fact that about one third of those with the disease are unrecognized would appear to make screening for diabetes an attractive proposition.[11] More emphasis on community screening programs and population-wide education programs would help increase the number of people who are screened for diabetes and would detect more cases. Evidence from the Diabetes Prevention Program study showed that improved nutrition and exercise significantly reduced the risk of developing diabetes among individuals with impaired glucose tolerance; in addition, after 10 years of follow-up, there was some reduction in CVD risk factors.[12, 13] However, there is little evidence that early detection in an asymptomatic state will result in early intervention that will reduce the risk of the long-term complications that represent the real morbidity of T2DM and the cause of premature death.[14] Viewed in this light, a prevalence of 43.6% of a representative sample of U.S. adults aged ≥20 years reporting a test for diabetes in the preceding 3 years may seem reasonable, possibly reflective of the overweight/obesity prevalence in the general population.[15, 16] Although we have no direct evidence that the majority of these tests result from opportunistic rather than public screening, the sharp increase in testing percentages as the number of visits to a physician increases from 0 to ≥10 suggests it is mostly opportunistic and targeting higher-risk individuals, as advocated by the ADA. For example, the percentage of testing is higher in those with a history of gestational diabetes and those

with obesity, hypertension, and CVD. It is modestly increased in those with a family history of diabetes and those aged ≥45 years. Not surprisingly, those with a prior history of prediabetes are the most likely to be tested (79.5%). In a supplemental analysis, the prevalence of undiagnosed diabetes was higher among those who had been screened, which further suggests that high-risk individuals are targeted for screening. Results from the regression analysis indicate that the likelihood of having a diabetes screening test increased by 51% with each additional risk factor. However, among participants found to have undiagnosed diabetes in the NHANES examination, there was little difference in the presence of ADA risk factors between those who had or had not had a screening test in the preceding 3 years.

Despite the evidence that some higher-risk individuals are being targeting for screening, it is concerning to see that minorities such as non-Hispanic blacks and all Hispanics known to be at increased risk for diabetes are not being singled out for testing based on these data.[17] Moreover, those with family income below the poverty level, less education, and lacking health insurance were found to be relatively underserved. Interestingly, the association between Hispanic ethnicity and having a screening test in the past 3 years became non-significant after adjusting for education, income, and health insurance. Nevertheless, when assessing significant predictors of screening according to the ADA criteria, Hispanic ethnicity remained a significant, negative predictor of screening among men. This same negative association was suggested, albeit marginally significant, for all adults and women. Whether these underprivileged individuals could practically benefit more from detection may depend on future public policy regarding use of healthcare resources.

There was a significant difference in screening by sex, with women more likely to have had a screening test than men. Supplementary analysis revealed that women were more likely to see a physician at least once in the past year (89.6%) than men (75.1%), which may explain the higher prevalence of screening in women. In addition, some differences were found between men and women in predictors of diabetes screening. Although a history of CVD was a significant predictor for men, it was not for women. Instead, a history of gestational diabetes was a significant predictor of screening for women. This result suggests that gestational diabetes is more common than and may precede the development of CVD in the studied population, and therefore was a more influential predictor for diabetes screening in women. Indeed, separate analyses indicated that the prevalence of gestational diabetes among women at aged 20–44 years was 21.7% (SE=1.14) whereas the prevalence of CVD was 0.1% (SE=0.06) to 0.3% (SE=0.11) for women of the same age group. Second, although BMI was not statistically significant for men, it was marginally significant; thus, BMI had a similar effect on predicting diabetes screening for men and women.

The prevalence of having any blood test for diabetes screening (43.6%) in the NHANES was higher than the prevalence of a fasting blood test (30.3%) in the NHIS. In addition, the prevalence of having a fasting glucose test was lower than the prevalence of screening by any type of blood test for all sociodemographic and diabetes-related factors that were assessed. Although the ADA did not change their guidelines until 2010 to recommend the addition of HbA1c as a diagnostic test for diabetes, which does not require fasting,[18, 19] it is

probable that many physicians were already using the HbA1c test for screening, as recommended by an expert committee prior to revisions of the ADA guidelines.[19]

Several guidelines for diabetes screening exist, including the U.S. Preventive Services Task Force (USPSTF) recommendations. These recommendations are based solely on a blood pressure cut-point of >135/80 mmHg and, as a result, are targeted toward those with undiagnosed diabetes who need treatment for both diabetes and elevated blood pressure and potentially other comorbidities. However, the USPSTF guidelines miss a large proportion of the population with undiagnosed diabetes; the proportion of adults identified (sensitivity) using blood pressure >135/80 mmHg was only 44.4%.[20] In addition to missing more than half of those with undiagnosed diabetes, a substantial proportion of those with undiagnosed diabetes had cardiovascular risk factors that warranted treatment of elevated blood pressure and lipids. Unlike the USPSTF guidelines, the ADA guidelines have the goal of identifying prediabetes as well as diabetes in order to prevent development of diabetes and its long-term complications. Unfortunately, to the authors' knowledge, no data exist on physician compliance with the ADA guidelines or how ADA recommendations for screening are being followed by physicians. Therefore, this study provides a comprehensive assessment of the prevalence of diabetes screening by several risk factor criteria.

The strength of this study lies in use of a nationally representative sample and the availability of much pertinent data spanning a breadth of age, race/ethnicity, education, income, body weight, and insurance coverage groups. An obvious limitation is reliance on self-reported data, with both underreporting and misreporting being possible. For example, participants may not be able to accurately recall over a 3-year period whether or not they had a test for diabetes. However, a strength of the NHANES study is the ability to assess several laboratory measures, including glucose and cholesterol, and examination measures, including BMI and blood pressure. Another limitation is the cross-sectional study design; only associations between screening criteria and a previous blood test could be determined.

In conclusion, testing for diabetes in a 3-year span is reported in nearly half the U.S. adult population without diabetes. There is some evidence that higher-risk individuals are being targeted for testing. However, testing is much less prevalent in the economically and educationally underprivileged segment of the population without health insurance. These results suggest that efforts to test these underserved individuals should be intensified.

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Table 1

Characteristics of the study populations[a]

	NHANES 2005–2010 (N=15,125)		NHIS 2006 (N=21,519)	
	%	95% CI[b]	%	95% CI
Age, mean years	45.6	45.0, 46.3	45.6	45.3, 46.0
Age (years)				
20–39	40.1	38.5, 41.7	40.0	39.1, 41.0
40–49	21.1	20.0, 22.2	21.9	21.2, 22.6
50–59	17.6	16.6, 18.6	17.5	16.8, 18.1
60–69	10.6	9.8, 11.5	10.2	9.7, 10.8
≥70	10.6	9.7, 11.6	10.4	9.9, 10.9
Sex				
Men	48.2	47.5, 48.9	48.1	47.3. 49.0
Women	51.8	51.1, 52.5	51.9	51.0, 52.8
Race/ethnicity				
Non-Hispanic White	70.5	66.5, 74.1	71.2	70.2, 72.2
Non-Hispanic Black	10.8	9.1, 12.7	11.2	10.6, 11.9
All Hispanic	12.7	10.4, 15.3	13.0	12.3, 13.7
Mexican American	8.3	6.6, 10.3	8.2	7.6, 8.8
Other Hispanic	4.4	3.2, 5.8	4.8	4.5, 5.2
Other Race/multiracial	6.1	5.1, 7.4		
Non-Hispanic Asian			4.6	4.2, 4.9
Education				
<High school	18.1	16.6, 19.7	15.8	15.0, 16.5
High school graduate	24.3	23.1, 25.6	28.3	27.4, 29.3
Some college/associates degree	30.3	29.4, 31.3	28.8	28.0, 29.7
College graduate or professional degree	27.2	25.1, 29.4	27.1	26.1, 28.0
Family Income				
<$20,000	17.8	16.6, 19.2	17.9	17.1, 18.7
$20,000–$34,999	18.0	16.9, 19.2	18.6	17.9, 19.3
$35,000–$54,999	18.6	17.5, 19.8	19.6	18.9, 20.2
$55,000–$74,999	13.6	12.5, 14.7	13.8	13.2, 14.5
≥$75,000	32.0	29.9, 34.2	30.1	29.1, 31.3
Health Insurance Coverage				
Yes	79.7	78.1, 81.3	82.2	81.5, 82.9
No	20.3	18.7, 21.9	17.8	17.1, 18.5
Prediabetes				
Yes	5.9	5.5, 6.4	4.5	4.1, 4.9
No	94.1	93.6, 94.5	95.5	95.1, 95.9
BMI (kg/m^2)				

	NHANES 2005–2010 (N=15,125)		NHIS 2006 (N=21,519)	
	%	95% CI[b]	%	95% CI
<25	33.5	32.1, 35.0	38.4	37.5, 39.3
25–<30	34.2	33.0, 35.3	33.8	33.0, 34.5
30–<35	19.1	18.4, 19.9	14.9	14.3, 15.5
35–<40	8.1	7.5, 8.8	5.1	4.8, 5.5
≥40	5.1	4.7, 5.5	7.8	7.3, 8.4
Number of times saw any physician or healthcare professional in past year				
None	17.4	16.6, 18.3		
1	19.7	18.9, 20.5		
2–3	28.0	27.1, 28.9		
4–9	22.5	21.7, 23.3		
≥10	12.4	11.6, 13.3		
Saw a general doctor in the past year				
No			35.6	34.7, 36.6
Yes			64.4	63.4, 65.3

[a] Study population includes adults age ≥20 years without a previous diagnosis of diabetes

[b] 95% CI=Confidence Interval

Table 2

Prevalence of having a diabetes screening test in the past 3 years by demographic characteristics

	Prevalence of having a blood test for diabetes in past 3 years NHANES 2005–2010 (N=15,125)		Prevalence of having a fasting blood test for diabetes in past 3 years NHIS 2006 (N=21,178)	
	%	95% CI[b]	%	95% CI
Total	43.6	42.6, 44.5	30.3	29.3, 31.3
Age (years)				
20–39	33.2	31.4, 34.9	21.8	20.7, 23.0
40–49	39.8	37.6, 41.9	30.6	28.9, 32.3
50–59	52.0	49.3, 54.7	36.7	34.6, 38.9
60–69	60.8	58.0, 63.5	42.3	39.7, 44.9
≥70	60.6	57.9, 63.4	40.0	37.5, 42.5
Sex				
Men	37.9	36.6, 39.2	27.8	26.4, 29.1
Women	48.7	47.3, 50.1	32.7	31.4, 34.0
Race/ethnicity				
Non-Hispanic White	44.5	43.2, 45.8	32.6	31.3, 33.9
Non-Hispanic Black	46.3	44.5, 48.0	29.3	27.2, 31.4
All Hispanic	38.9	37.1, 40.8	22.2	20.6, 23.8
Mexican American	38.6	36.2, 41.1	22.6	20.4, 24.8
Other Race/multiracial	38.0	33.5, 42.6		
Non-Hispanic Asian			20.9	18.0, 23.7
Education				
<High school	40.5	38.2, 42.7	26.2	24.3, 28.0
High school graduate	40.4	37.9, 43.0	29.1	27.4, 30.8
Some college/ associates degree	45.1	43.2, 47.1	30.8	29.2, 32.3
College graduate or professional degree	46.6	44.5, 48.8	34.5	32.7, 36.2
Family Income				
<$20,000	39.2	37.1, 41.3	26.6	24.9, 28.3
$20,000–$34,999	40.7	38.7, 42.8	27.1	25.4, 28.8
$35,000–$54,999	43.5	40.9, 46.1	29.4	27.5, 31.3
$55,000–$74,999	45.9	42.3, 49.5	30.9	28.6, 33.1
≥$75,000	47.1	45.4, 48.8	34.8	33.1, 36.5
Health Insurance Coverage				
Yes	47.9	46.8, 48.9	33.3	32.1, 34.4
No	27.0	24.9, 29.1	16.9	15.4, 18.4
Prediabetes				
Yes	79.5	76.6, 82.4	65.7	61.7, 69.7
No	41.2	40.3, 42.1	28.7	27.7, 29.7

	Prevalence of having a blood test for diabetes in past 3 years NHANES 2005–2010 (N=15,125)		Prevalence of having a fasting blood test for diabetes in past 3 years NHIS 2006 (N=21,178)	
	%	95% CI[b]	%	95% CI
BMI (kg/m^2)				
<25	35.6	33.9, 37.3	24.9	23.6, 26.2
25–<30	42.5	40.7, 44.2	30.3	28.7, 31.9
30–<35	50.0	47.0, 52.9	39.2	37.0, 41.5
35–<40	56.3	52.3, 60.2	41.3	37.7, 44.9
≥40	60.5	57.1, 63.9	32.5	29.6, 35.3
Number of times saw any physician or healthcare professional in past year				
None	17.4	15.6, 19.3		
1	36.5	34.2, 38.7		
2–3	48.5	46.6, 50.5		
4–9	55.7	53.5, 57.9		
≥10	59.1	56.7, 61.6		
Saw a general doctor in the past year				
No			17.0	15.9, 18.2
Yes			37.8	36.5, 39.2

[a] Study populations include adults age ≥20 years without a previous diagnosis of diabetes

[b] 95% CI=Confidence Interval

Table 3

Prevalence of diabetes screening criteria and having a diabetes screening test according to ADA criteria

	NHANES 2005–2010			
	Prevalence of Screening Criteria		Blood Test for Diabetes in Past 3 Years	
	%	95% CI[h]	%	95% CI
ADA Criteria				
Overweight	66.4	65.0, 67.9	47.7	46.3, 49.0
Adults who are overweight (BMI≥25 kg/m^2) AND				
Risk Factors				
Physical inactivity[a]	12.7	11.7, 13.7	50.6	48.4, 52.8
First-degree relative with diabetes	25.4	24.3, 26.4	54.7	52.6, 56.7
High Risk Race/Ethnicity				
Non-Hispanic black	7.9	6.7, 9.3	50.5	48.3, 52.7
Hispanic	9.4	7.6, 11.5	41.5	39.5, 43.4
Mexican American	6.3	4.9, 8.0	41.2	38.9, 43.6
Gestational Diabetes[b]	5.6	5.0, 6.3	58.8	52.3, 65.3
Hypertension[c]	21.5	20.4, 22.6	61.8	59.7, 64.0
HDL Cholesterol <35mg/dL	7.5	6.9, 8.2	42.0	38.3, 45.7
Triglyceride level >250mg/dL	6.2	5.5, 7.1	48.9	43.3, 54.4
Elevated glucose[d]	54.4	51.9, 56.8	54.1	52.2, 56.1
Severe obesity[e]	5.1	4.7, 5.5	60.2	56.8, 63.6
History of CVD[r]	3.8	3.5, 4.3	65.5	60.8, 70.2
Multiple Criteria[g]				
+ 2 criteria	28.0	26.7, 29.3	46.3	43.4, 49.9
+ 3 criteria	19.2	18.0, 20.4	58.2	54.8, 61.5
+ 4 criteria	10.6	9.8, 11.5	61.9	57.1, 66.8
+ ≥5 criteria	4.7	4.1, 5.4	63.9	58.9, 68.9
All Adults				
Age ≥45 years	49.5	47.7, 51.3	53.2	51.6, 54.8
Adults Age ≥45 years who are Overweight	34.6	33.2, 36.1	56.9	55.1, 58.8
+ 2 criteria[g]	28.8	26.4, 31.3	57.0	53.5, 60.6
+ 3 criteria	23.1	21.8, 24.5	64.1	59.7, 68.5
+ 4 criteria	13.7	12.3, 15.1	67.9	61.5, 74.3
+ ≥5 criteria	6.0	5.0, 7.2	66.1	60.1, 72.1

[a] Self-report; no transportation (bike/walk), work-related (house/yard/paid job), or recreational activity

[b] Self-report; diagnosed with GDM or delivered baby >9lbs.; NHANES 2007–2010

[c] BP≥140/90mmHg or on therapy for hypertension

[d] Elevated glucose includes A1c≥5.7%, impaired fasting glucose ≥100mg/dL, or impaired glucose tolerance ≥140mg/dL

[e] BMI≥40kg/m2

[f] History of CVD includes heart failure, coronary heart disease, angina, or heart attack

[g] NHANES 2007–2010; Criteria include physical inactivity, first-degree relative with diabetes, high-risk race/ethnicity, gestational diabetes, hypertension, low HDL cholesterol, high triglycerides, elevated glucose, severe obesity, history of CVD

[h] 95% CI=Confidence Interval

Study population includes adults age ≥20 years without a previous diagnosis of diabetes

Table 4

Logistic regression for having a fasting blood test in the past 3 years

	All Adults NHANES 2005–2010	
	OR	**95% CI[c]**
Individual Screening Criteria[a]		
BMI≥25	1.40	1.25, 1.57
Age≥45	1.68	1.49, 1.90
Relative w/ DM	1.54	1.40, 1.70
Hypertension	1.67	1.48, 1.88
A1c≥5.7%	1.28	1.15, 1.42
CVD	1.23	1.00, 1.51
Each Additional Screening Criteria[b]	1.51	1.45, 1.57

[a] Model includes only screening criteria variables that were significant ($p<0.05$) after backwards step-wise elimination; initial model included BMI≥25, Age≥45, Relative with diabetes, non-Hispanic black or Hispanic race/ethnicity, Hypertension, HDL≤35mg/dL, A1c≥5.7%, history of CVD

[b] Multiple criteria includes: BMI≥25, Age≥45, Relative with diabetes, Hypertension, A1c≥5.7%, CVD; OR indicates the likelihood of having a screening test in the past 3 years for the presence of any additional screening criteria (i.e., participants are 51% more likely to be screened for diabetes in the past 3 years if they have 2 vs. 1 [or 4 vs. 3] of the above screening criteria).

[c] 95% CI=Confidence Interval

Study population includes adults age ≥20 years without a previous diagnosis of diabetes