Factors Associated With Being Unaware of Having Diabetes

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An improved understanding of which groups are more likely to be unaware of their diabetes may lead to more efficient screening, improved awareness, and overall better treatment for diabetes. Our objective was to investigate factors associated with being unaware of having diabetes among adults with diagnosed and undiagnosed diabetes.

The 2011–2014 National Health and Nutrition Examination Survey (NHANES) is a stratified, multistage probability survey representative of the civilian, noninstitutionalized U.S. population (1). Data were collected during an in-home interview and a visit to a mobile examination center. We used data from 1,879 participants with either diagnosed or undiagnosed diabetes (based on a single measurement of A1C, fasting plasma glucose, or 2-h plasma glucose).

Using logistic regression, we calculated odds ratios of being unaware of diabetes associated with age, race/ethnicity, sex, gestational diabetes mellitus (GDM), family history of diabetes, education, household income, smoking status, BMI, work-time activity, leisure-time activity, no health insurance, location of routine health care, no health care in the past year, hospitalization in the past year, hypertension, and hyperlipidemia. Initial

models were unadjusted and subsequent models adjusted for all other variables. We repeated the analysis stratified by sex. Appropriate sample weights were used so that the sum added to the total civilian noninstitutionalized U.S. population (2).

Overall, 34.3% were unaware of their diabetes. In unadjusted models, compared with people aged 20–44 years, participants aged 45–64 years had 34% lower odds of being unaware of their diabetes (Table 1). Compared with non-Hispanic whites, non-Hispanic Asians had 75% higher odds and Hispanics of non–Mexican American descent had 69% higher odds of being unaware. In addition, a family history of diabetes, hospitalization in the past year, hypertension, health insurance, routine place for health care, and health care in the past year were associated with awareness. After adjustment, people with a family history of diabetes had about half the odds of being unaware, people who did not receive health care in the past year had approximately a sixfold higher odds of being unaware, and people who were hospitalized in the past year had one-third lower odds of being unaware.

Among men, having a family history of diabetes, having a BMI 25.0–29.9 kg/m^2, and receiving no health care in the past

year were associated with being unaware after adjustment. Among women, being of Mexican American or other Hispanic descent, having a family history of diabetes, receiving routine health care other than at a doctor's office, and receiving no health care in the past year were associated with being unaware after adjustment.

Overall, approximately one-third of people with diabetes were undiagnosed/unaware of it. Non-Hispanic Asians and Hispanics of non–Mexican American descent were more likely to be unaware in unadjusted models but not after adjustment. In adjusted models, those with a family history of diabetes and those who had been hospitalized in the past year were less likely to be unaware, while those who received no health care in the past year were more likely to be unaware. Results were generally consistent when stratified by sex except that Mexican American and other Hispanic women were more likely to be unaware of their diabetes.

Some participants may have been misclassified, as a repeat measurement is recommended by the American Diabetes Association after a single positive test based on A1C, fasting plasma glucose, or 2-h plasma glucose; however, the NHANES only includes one study visit. Also, since participants self-reported

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Table 1—Odds ratios (95% CI) of being unaware of having diabetes among people with diabetes, U.S., 2011–2014

	Unadjusted	Adjusted†		
	Overall	Overall	Men	Women
Age				
20–44 years	Reference	Reference	Reference	Reference
45–64 years	**0.66 (0.45–0.97)**	0.76 (0.51–1.13)	1.02 (0.55–1.89)	0.53 (0.27–1.05)
≥65 years	0.70 (0.48–1.01)	0.99 (0.68–1.44)	0.92 (0.51–1.67)	1.17 (0.63–2.18)
Race/ethnicity				
Non-Hispanic white	Reference	Reference	Reference	Reference
Non-Hispanic black	0.86 (0.56–1.32)	1.11 (0.75–1.64)	0.93 (0.51–1.70)	1.46 (0.85–2.49)
Non-Hispanic Asian	**1.74 (1.18–2.58)**	1.44 (0.82–2.54)	1.52 (0.66–3.49)	1.72 (0.68–4.39)
Mexican American	1.23 (0.86–1.76)	1.06 (0.73–1.53)	0.62 (0.34–1.11)	**1.91 (1.09–3.34)**
Other Hispanic	**1.69 (1.08–2.62)**	1.30 (0.78–2.14)	0.96 (0.40–2.30)	**2.21 (1.12–4.34)**
Sex and GDM status				
Women without GDM	Reference	Reference	—	Reference
Women with GDM	1.02 (0.68–1.51)	1.06 (0.68–1.65)	—	1.04 (0.65–1.65)
Men	1.23 (0.84–1.79)	1.07 (0.71–1.61)	—	—
Family history of diabetes	**0.53 (0.39–0.72)**	**0.48 (0.33–0.70)**	**0.43 (0.25–0.76)**	**0.53 (0.32–0.88)**
Education				
Greater than high school education	Reference	Reference	Reference	Reference
High school education	0.99 (0.66–1.48)	1.07 (0.65–1.78)	0.85 (0.40–1.82)	1.17 (0.63–2.18)
Less than high school education	1.02 (0.67–1.57)	0.98 (0.56–1.70)	1.23 (0.59–2.57)	0.65 (0.34–1.26)
Household income <$20,000	0.84 (0.62–1.14)	0.88 (0.65–1.21)	1.05 (0.67–1.65)	0.85 (0.50–1.45)
Smoking status				
Never smokers	Reference	Reference	Reference	Reference
Former smokers	0.97 (0.71–1.31)	0.96 (0.63–1.46)	1.06 (0.60–1.87)	0.82 (0.39–1.71)
Current smokers	0.84 (0.60–1.17)	0.75 (0.51–1.12)	0.63 (0.37–1.08)	1.09 (0.49–2.44)
BMI				
<25 kg/m^2	Reference	Reference	Reference	Reference
25–29.9 kg/m^2	1.15 (0.79–1.67)	1.17 (0.66–2.07)	**2.56 (1.23–5.30)**	0.53 (0.24–1.21)
30–34.9 kg/m^2	0.90 (0.52–1.56)	0.95 (0.45–1.99)	2.04 (0.69–6.03)	0.49 (0.18–1.31)
≥35 kg/m^2	0.70 (0.43–1.15)	0.77 (0.39–1.53)	1.52 (0.53–4.35)	0.47 (0.21–1.05)
Low work-time activity levels	0.86 (0.59–1.23)	0.74 (0.48–1.12)	0.66 (0.39–1.14)	0.77 (0.44–1.34)
Low leisure-time activity levels	1.03 (0.74–1.43)	1.13 (0.78–1.64)	0.99 (0.58–1.68)	1.43 (0.85–2.40)
No health insurance	**1.79 (1.29–2.48)**	1.25 (0.74–2.11)	1.21 (0.64–2.27)	1.32 (0.61–2.83)
Routine health care location				
Health care at doctor's office or HMO	Reference	Reference	Reference	Reference
Other place for health care	0.90 (0.61–1.34)	0.68 (0.41–1.11)	0.82 (0.48–1.40)	**0.51 (0.30–0.90)**
No routine place for health care	**2.61 (1.68–4.05)**	0.79 (0.43–1.47)	1.00 (0.52–1.89)	0.89 (0.29–2.73)
No health care in the past year	**5.88 (3.47–9.99)**	**5.85 (2.39–14.34)**	**5.12 (1.54–17.06)**	**7.03 (2.67–18.51)**
Hospitalized in the past year	**0.54 (0.41–0.73)**	**0.66 (0.44–0.99)**	0.57 (0.26–1.27)	0.67 (0.38–1.17)
Hypertension	**0.68 (0.51–0.91)**	0.74 (0.53–1.02)	0.66 (0.39–1.12)	0.78 (0.46–1.30)
Hyperlipidemia	0.81 (0.57–1.14)	0.80 (0.51–1.24)	0.96 (0.57–1.63)	0.65 (0.34–1.24)

HMO, health maintenance organization. †Adjusted for all other variables listed in the table. Odds ratios in boldface type are statistically significant at $P < 0.05$.

many of the variables in our analysis, there may be inaccuracies.

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